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ABSTRACT

A conference was held to improve the environmental awareness of colleges in such areas as energy conservation, waste management, transportation policy, and use of grounds. This document contains the presentations of speakers who attended the conference. Chapter 1, "Greening Further and Higher Education" (Shirley Ali Khan), discusses the need for higher education institutions to aid in educating citizens of the impact that humans have on the environment. Action plans and recommendations for implementations are included. Chapter 2, "Minimizing Waste" (Jo Gordon), provides a brief discussion of the problem of waste and later focuses on actions that can be taken by colleges to aid in reducing waste. Chapter 3, "How to Save on Energy Costs and Consumption: The Middlesex University Experience" (Jim Jevons), describes how major savings in energy costs and consumption at Middlesex University were made. Chapter 4, "Environmental Management and Educational Institutions" (Rick Kelly), discusses the possible impacts on educational institutions of: (1) British Standard BS 7750: Environmental management systems; (2) Environmental standardization programs, which are being undertaken internationally; and (3) the European Community's eco-management and audit scheme. Chapter 5, "The Creative Use of Land Round Colleges: Sustainable Grounds Management" (Bill Lucas), provides insight on the development of landscapes for the school grounds. Chapter 6, "Environmental Transport Strategies for Educational Institutions" (Phil Haughton), presents transport strategies for aid in reducing the potential harm of transportation vehicles on the environment. Chapter 7, "The Environmental Challenge" (Sally Richardson), provides a discussion of a government report (Environmental Responsibility-An Agenda for Further and Higher Education). (ZWH)

ED 376 050

The Staff College

Environmental issues in further and higher education

by Shirley Ali Khan
and other contributors

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Environmental issues in further and higher education

by Shirley Ali Khan, Jo Gordon, Jim Jevons, Rick Kelly, Bill Lucas, Phil Haughton and Sally Richardson

Edited by Susan Leather

Coombe Lodge Report
Volume 23 Number 10

3

Coombe Lodge Reports

The Coombe Lodge Reports are key reference texts for those involved with the management of post-compulsory education. Each issue focuses on a single theme relevant to the management of further and higher education.

Recent topics covered include resource management, the management of student services and the changes that are likely to occur in the governing of colleges after incorporation.

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Foreword

Bob Saunders
Staff Tutor
The Staff College

Early in 1993 The Staff College asked me to organise a three-day conference on *Environmental issues in further and higher education.* As I had an interest in green issues, I agreed to try.

Faced with the task of deciding conference content and finding suitable speakers I quickly realised the depth of my ignorance on environmental matters. Luckily, I had seen a copy of **Colleges going green** and this gave me the inspired idea of asking Shirley Ali Khan for help and advice.

She quickly taught me that there are two separate but related environmental problems for education: the greening of the curriculum and the need for colleges themselves to become environmentally aware and organised. Colleges will have no credibility at all to their students if they include environmental issues in every aspect of the curriculum and then belie their teaching by their own bad practice.

We therefore decided that our conference should concentrate on improving a college's own environmental performance, in such areas as energy conservation, waste management, transport policy, use of grounds and so on. The aim would be to put forward practical and financially viable ideas which colleges could introduce or move towards in the shorter term.

I began to contact some of the people Shirley suggested as ideal speakers on different environmental issues and quickly found that there is a network of highly able enthusiasts working in specialised environmental areas who are only too keen to encourage others to follow their lead.

We were able, therefore, to bring together a team of speakers who were not only knowledgeable in their fields but fluent in communicating their commitment. To some extent, inevitably, they were preaching to the converted. By and large, the conference appealed to people who already had a commitment to the environment and many of the course participants were already leaders in their college's 'green teams'.

Presentations of this quality deserved a wider audience, including people who had perhaps not yet become aware of the environmental priority or the financial benefits which going green can bring. Hence the decision to publish the papers in this Coombe Lodge Report. This meant it was also possible to incorporate information about subsequent developments when preparing the texts for a wider audience.

Whether you are concerned about global warming; local air pollution; litter in your college grounds; the escalating cost of electricity and gas; or indeed whether you see the environment as a low priority issue – whatever your viewpoint, there is something here for you.

Chapter 1

Greening further and higher education

Shirley Ali Khan
National Co-ordinator for Further and Higher Education
Council for Environmental Education

AUTHOR'S BACKGROUND

Committee of Directors of Polytechnics:
National Co-ordinator for 'Greening Polytechnics' 1990–1992

Council for Environmental Education:
National Co-ordinator for Further & Higher Education 1992 – ongoing.

University of Hertfordshire:
Director, Environmental Responsibility Centre 1993 – ongoing.

Member of various National Environment/Education Committees.

INTRODUCTION

If the earth were only a few feet in diameter, floating a few feet above a field somewhere, people would come from miles around to marvel at it. People would walk around it marvelling at its big pools of water, its little pools and the water floating between. People would marvel at the bumps on it and the holes in it. And they would marvel at the thin layer of gas surrounding it, and the water suspended in the gas. The people would marvel at the creatures walking around the surface of the ball and

the creatures in the water. The people would declare it as sacred, because it was the only one. And they would protect it so it would not be hurt. The ball would be the greatest wonder known and people would come to pray to it to be healed, to gain knowledge, to know beauty and to wonder how it could be. The people would love it and defend it with their lives, because they would somehow know that their lives could be nothing without it, **if** the world were only a few feet in diameter.

The idea that the earth and its life are complex and precious is a good starting point. Whilst scientists may disagree about the extent of damage to the global environment, the effects of environmental degradation are already becoming quite clear. The casualties of major pollution accidents and the environmental refugees who are fleeing from large development programmes or from their island homes which are sinking into rising seas, all paint a desperate if somewhat distant picture. More subtle, and therefore more sinister, is the loss of environmental quality in the lives of ordinary people – the respiratory complaints that many city dwellers now suffer from because of pollution and the increased incidence of cancers and allergies due to environmental poisons. These examples are indicative of the sort of malaise that we are currently suffering. There is a growing realisation that human impact on the environment cannot be controlled by legislation alone, and that what is needed is the implementation of environmental law which addresses its spirit and not just its letter.

ENVIRONMENTAL RESPONSIBILITY

In order to implement the spirit of environmental law, it is necessary to have the co-operation of citizens who can take account of the environment, not only in their work, but in their everyday lives. The government White Paper on the environment, **This common inheritance** (Department of Environment 1990), contains numerous calls to citizens to act in an environmentally responsible way. The government is very keen on the idea of environmentally responsible citizenship. The question is, how to enable this?

The basic ingredients of active environmental citizenship are appropriate knowledge, the ability to act on that knowledge, and a commitment to sustainability. Where are people going to develop such skills? Certainly not from reading government White Papers. The obvious answer has to be via the education system. There are a number of strategic initiatives which are

encouraging further and higher education institutions to address their environmental responsibilities. One such initiative was set up by the Further Education Unit, and the outcome of that exercise was the publication **Colleges going green** (Ali Khan 1992).

Colleges going green is a publication with a purpose. The purpose is to promote active environmental citizenship. This means citizens with appropriate knowledge, the ability to act upon what they know and a commitment to the achievement of sustainability.

INTRODUCING A PURPOSE INTO EDUCATION

This introduces a new purpose into education. Is it beyond the proper purpose of education to encourage action of any kind? In other words, should education confine itself to enabling understanding and developing skills?

I would argue that the existing education system has numerous action agendas – including the production of more scientists, increased participation in Europe, increased use of information technology – and as such I see no reason why we should sit on the fence as regards action for the environment.

THE WHOLE INSTITUTION RESPONSE

The emphasis is on a whole college response to environmental concerns, which requires all areas of college activity to take account of the environment.

The learning environment is commonly viewed as a neutral backcloth against which learning takes place. This is a misconception. The learning environment, which includes both buildings and estates, communicates powerful messages about resource use and care for others, whether it has been improved or not.

For instance, litter on site communicates an indifference to natural resource cycles; seats in rigid rows communicate a didactic as opposed to an interactive approach to learning; walls painted in battleship grey communicate a lack of care and flair on the part of the providers; over-heated classrooms communicate an approval of resource wastage.

Colleges wishing to promote environmentally responsible citizenship will not

succeed if their institutional practices are environmentally unsound. They must practise what they teach. The sustainable management of the learning environment is, therefore, not just 'a nice thing to do', it is an imperative.

THE SUSTAINABLE MANAGEMENT OF THE LEARNING ENVIRONMENT

Colleges going green sets out in some detail the breadth of a whole institution response. There are in the order of a hundred recommendations of WHAT to do. The rest of this chapter looks at HOW the implementation of such actions might be facilitated.

POLICY

The development of an institutional policy is an important first step as it gives permission and authority for new initiatives within the institution and endorses existing initiatives. It may be a simple general statement such as that shown in **Figure 1**.

Figure 1: statement of environmental policy

It is the policy of the green college to set all learning in its appropriate environmental context, to reduce the environmental impact of its own practices to sustainable levels and to promote positive interaction between staff, pupils and the environment.

Alternatively, a college may develop a detailed policy for each operational area, such as the purchasing policy shown in **Figure 2**.

There are advantages to these simple statements in that principals seems to find them easier to sign.

There are other sample environmental policy statements included in **Colleges going green**. However, please beware of slavishly copying the models, be they

Figure 2: Sample purchasing policy statement

The polytechnic will operate a purchasing policy, within the wider framework of financial regulations and legislative requirements, based on the following principles:

1. Environmentally friendly products will be purchased wherever possible and in accordance with agreed lists of (environmentally approved) products reviewed annually.

2. The polytechnic will seek to purchase from companies who do not operate discriminatory practices. Wherever possible, the polytechnic will not deal with companies who are known to operate discriminatory practices. All polytechnic contracts will include a clause upon which contract compliance will be sought.

3. Products will be purchased normally within the northwest of England and wherever possible in Lancashire and Cumbria.

4. Products will be purchased from within ranges of standard items approved by the polytechnic.

5. Purchasing will be on the basis of 'just-in-time' to prevent unnecessarily large levels of stock being maintained.

Within these principles the polytechnic will seek to achieve the best possible value for money.

Source: University of Central Lancashire (formerly Lancashire Polytechnic).

policies, strategies or detailed examples of good practice. Models tend to encourage people to shed their creative responsibilities. There is no definitive environmental approach. Much experimentation is necessary.

COMMUNICATION

The communication of a college's environmental policy, strategy and achievements is the key to encouraging participation of staff, students and the local community. It is important to target your environmental communications carefully.

Communications for internal staff

Policy statement	Communicate via staff induction courses. Nail it to your walls. The more widely your policy statement is known, the more likely it is to be implemented.
Priority actions	Communicate via newsletter, memo, principal's notice-board, in-house magazine, posters. There is a need to communicate the complexity of the environmental response. It is important to tell the truth.
Specific communications	Highlight specific ways in which different groups might become involved, e.g. using sections of the publication **Colleges going green**.

Communications for prospective students

Environmental policy statement/mission: communicated via your prospectus.

Students are very concerned about the environmental performance of the institutions in which they study. The following statement from the National Union of Students (NUS) shows just how concerned they are:

> The 'greening' of colleges is a positive step forward in education. Increasingly, as students are more environmentally aware, institutions

which have a 'green' profile will be seen as more attractive places to study in. Both the students and the institutions should benefit greatly from this 'greening' of colleges.

The NUS complained, in their report to the Toyne Committee (investigating the environmental education requirements in F and HE), that students currently wishing to study at environmentally responsive educational institutions could not make informed choices due to the lack of information relating to environmental performance.

Nobody has developed environmental performance indicators. What might they be? The following are possible examples:

- legislative compliance;
- policy and strategy, which are indicators of environmental responsiveness, but do not give a measure of performance;
- energy use per student (heating, lighting and ventilation);
- paper use per student, including percentage of recycled paper used and the recycled content of recycled paper;
- the percentage of students who have the opportunity to explore their environmental responsibilities as individuals and in the context of their chosen subjects.

It is not that performance indicators are difficult to identify, more that institutions are reluctant to reveal their environmental performance. It would certainly be useful to include environmental performance indicators in prospectuses, in the light of student concern.

Curriculum entitlement for environmental education for all students – easy to say and not so easy to do – would also be a useful way of communicating environmental responsiveness to prospective students.

Student Charters are another vehicle for outlining staff and student responsibilities to the environment.

COMMITMENT FROM THE TOP

The commitment of principals to institutions' environmental response is of key importance. Principals can:

- make and drive policy;
- create accountability: for instance, they could introduce environmental responsibility into the strategic planning process;
- lobby the Funding Councils for earmarked funding which colleges could bid for. The funding could be tied to the achievement of specific environmental objectives.

By this I am not suggesting that the environmental response is dependent on money. It isn't. Much can be done without money or by spending existing money differently, especially as regards the institutional response. However, greening the curriculum is a tall order and institutions need help. In particular, there is a need for staff development and supporting resources.

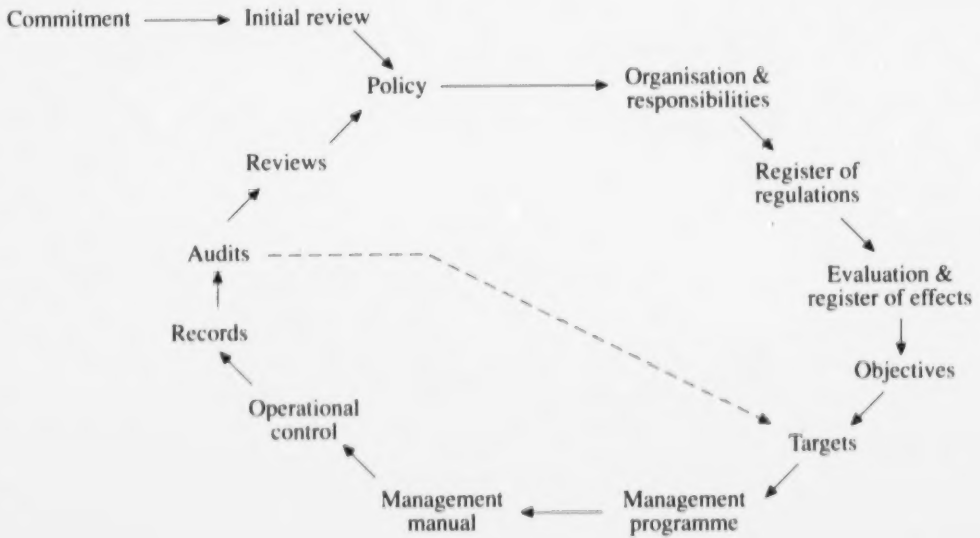
What principals cannot do is to green the college single-handed. **Everybody** – staff and students – must be involved. **Everyone** must play a part.

In **Colleges going green**, the establishing of a 'green team' is recommended, to help define roles for all institution members and to put systems in place to enable progress to be both demonstrated and measured.

MANAGEMENT/ACCOUNTABILITY

The environmental response can be managed within a college's quality management system, whether this be BS 5750 or Total Quality Management (TQM). The proposed EC regulation in relation to environmental management and auditing systems (EMA) requires companies to have an environmental management system. The British Standards Institution (BSI) has recently published its environmental management systems standard, BS 7750, which is complementary to the EMA regulation, the directive on eco-labelling, BS 5750 and – some would argue – TQM. It does not lay down specific performance criteria. See **Figure 3** for a diagrammatic representation of an environmental

Figure 3: Implementation of an environmental management system



management system. Rick Kelly's chapter gives a more detailed account of BS 7750, and the issues relating to environmental management systems.

THE ADVANTAGES OF 'GREENING'

Responding to the environmental imperative contributes to the efficient and effective delivery of further and higher education. Specific benefits include:

- enhanced recruitment potential;
- prestige;
- quality gains;
- cost savings.

REFERENCES

Ali Khan, Shirley (1992) **Colleges going green: a guide to environmental action in further education colleges**. Further Education Unit in collaboration with the Council for Environmental Education. Available free of charge from the FEU, Spring Gardens, Citadel Place, Tinworth Street, London SE11 5EH

British Standards Institution (1992) **BS 7750 Environmental management systems.** BSI

Department of the Environment (1990) **This common inheritance**. Cm 1200 HMSO

Chapter 2

Minimising waste

Jo Gordon
Director
Waste Watch

WHAT IS WASTE WATCH?

Waste Watch is the national agency for the promotion of action on waste reduction and recycling. It was established by the National Council for Voluntary Organisations in 1987, becoming an independent charity in April 1992.

Waste Watch works at a number of different levels. It handles enquiries on waste reduction and recycling from the general public, community groups, schools, local authorities and offices. This can be anything from how to recycle wine bottle corks, where to buy compost toilets, and whether cutting a PVC cup will damage the ozone layer, to how to set up a plastics recycling scheme. Enquiries are dealt with by our recently launched Wasteline service (071-388 4277) which handles between 300 – 400 telephone and written enquiries each week.

Waste Watch also provides advice and information to community groups involved in recycling, via one-to-one work, publications, regionally based training events and a consultancy service called Recycling Expertise. This works as follows: groups establishing or developing recycling schemes can access the knowledge and experience of an established group and that group will then receive a payment for their time as consultants.

In addition, Waste Watch provides consultancy services to businesses generally

regarding the use of recycled paper in offices and the recycling of paper and other wastes from offices.

Finally, Waste Watch also works to promote recycling and waste reduction at a national level, in collaboration with central government, industry and local authorities. It does this by producing a range of publications on various aspects of recycling, through training events, national conferences and by national events such as Watch Your Waste Week, co-ordinated for the Department of the Environment by Waste Watch and held in March 1993.

INTRODUCTION

Before looking at specific ways in which further and higher education colleges might begin to tackle reducing the amount of waste they produce, I think it is important to see why waste minimisation is the key to any waste management strategy, regardless of who or where you are.

In the waste management hierarchy waste minimisation comes first (see **Figure 3**). This is because in environmental terms it makes sense to avoid the creation of waste in the first place rather than look at ways of disposing of it once it has been created.

Figure 3: The waste management hierarchy

Waste reduction

Reuse

Recycling

Incineration

Landfill

Minimisation can mean avoidance, e.g. refraining from buying things that you do not need, or avoiding over-packaged goods. It includes avoiding disposable items such as cups, plates, cutlery and so on. Instead, buy a teapot and mugs. Use refillable rather than one-trip containers. Buy goods that are packaged in recycled/recyclable containers.

Some of these options are only really effective if they are linked to further action – there is no point in avoiding over-packaged goods if you do not explain to the retailer/manufacturer what your objection is.

Many companies have looked at waste reduction as a sensible management practice. Avoiding waste can reduce disposal costs. It can also save money in other ways. Take, for example, a frozen pizza – a fine example of over-packaging. Sainsburys have recently stopped including a polystyrene base in their pizzas, which has saved hundreds of thousands of pounds.

THE PROBLEM OF WASTE

Every year Britain throws away 20 million tonnes of domestic refuse – that is around one tonne for every family. Around one million tonnes of printing and writing papers are disposed of from businesses every year. Most of this waste (around 87 per cent) goes into landfill sites – only 5 per cent is currently recycled, whilst the remaining 8 per cent is incinerated. Compared with many of our European partners these are very low levels of recycling – in Denmark, for example, 70 per cent of waste is turned into useful energy by being burnt to generate electricity and heat, 10 per cent is recycled and only 20 per cent is landfilled. Apart from the waste of resources, landfill poses a number of environmental problems:

- chemical and other substances can leak out to pollute ground and surface water and the surrounding countryside;

- the build-up of methane gas in landfill sites can pose a hazard if not carefully controlled. Methane is a greenhouse gas 20 times more damaging than carbon dioxide;

- as sites fill up, waste has to be transported over increasing distances, increasing the amount of carbon dioxide emissions and thus contributing

to the greenhouse effect, along with the more local problems of heavy lorries in rural areas;

- lorries leaving mud on the roads, potentially hazardous to traffic.

Yet most of this waste is not rubbish – around 50–60 per cent of waste could be re-used or recycled to make new products, saving an estimated £750 million on limited and often imported raw materials each year. Where waste cannot be re-used or recycled, energy from waste schemes can be developed.

In recognition of these problems, the **Environmental Protection Act 1990** introduced a number of measures designed to increase the cost of landfill and boost the attractiveness of recycling household waste. The government has set a target of recycling 25 per cent of household waste by the year 2000 and given local authorities new duties and powers to encourage recycling.

Much of the focus tends to be on household waste because it is visible and there is wide public interest and concern, but there is much that businesses can do to reduce and recycle wastes, and many business products are now available in recycled versions. The purpose of this chapter is to outline the environmental arguments – and to clear up some of the environmental confusions around – as well as to suggest some practical measures which can be taken to reduce and recycle in colleges.

OFFICES, COLLEGES AND WASTE

You will need little reminding about how much paper is wasted in offices, due to typing and printing errors, excess photocopying, outdated documents, stationery alterations following changes of address or personnel, etc. Unsolicited incoming mail and used envelopes also fill up the waste bin each day. You will also be familiar with the use of high quality paper, printed on one side only, for internal documents. Computers seem to be adding to the problem rather than heralding the paperless office, as more and more drafts are printed out on those wonderfully fast laser printers. When you visit the staff restaurant or use vending machines you are reminded of further wastes – plastic cups, cans and bottles – and now many staff canteens make considerable use of individual portions of butter, jams, milk and disposable cutlery and plates.

Yet there are many things that you can do to improve the situation. Waste

avoidance and minimisation are often the easiest and most environmentally beneficial steps you can take – they are also most likely to save money on your purchasing budgets. There are recycled papers available for virtually all office uses. Waste paper and other materials, such as cans, bottles, plastic cups, and photocopier and laser printer cartridges can be sent for recycling.

Some of you may be asking if it is really beneficial to the environment to use recycled paper: if we already use environmentally friendly paper, is that not good enough? Is it really worthwhile saving our paper for recycling when we read stories about the paper mills having too much paper? Does it not use more energy collecting, transporting and reprocessing all these waste materials? Finally, but perhaps most importantly, we are concerned about the environment, but in the current recession and political climate we are even more concerned to protect our future – we have to work within tight budgets so these ideas will be of little use if they end up costing more money.

Let us begin by looking at paper.

PAPER – THE ENVIRONMENTAL ARGUMENTS

The common idea about using recycled paper and recycling waste paper is that it saves trees, but this is rather a misconception. Trees for paper-making are grown and harvested like any other crop – for every tree that is cut down to make paper, at least one more is planted in its place. This has been true of the pulp industry for years, but some paper-makers have rather exploited the fact to describe paper made from wood grown in sustainable forests as 'environmentally friendly'. The fact is that virtually all paper is made from wood grown in sustainable forests. More important issues are the location of those forests, the production processes involved in producing virgin paper, energy consumption and waste reduction.

The location of forests is a contentious issue. In many cases, fast growing coniferous and eucalyptus forests are being planted in areas where they are not indigenous, endangering native flora and fauna. The planting of conifers in Scotland or eucalyptus in Portugal and Spain are examples of this. Greater use of recycled paper reduces the need for the wrong type of forest in the wrong area.

Virgin pulp has to be bleached and the commonest form of bleach is chlorine,

which produces dioxins as a by-product. These dioxins pollute the water supply and are highly toxic. Recycled paper is not usually re-bleached as it will have been bleached originally as virgin pulp and, even where it is, oxygen rather than chlorine bleaching is used. Some producers of virgin paper are now using oxygen bleaching instead of chlorine bleaching so where recycled paper is not suitable, non-chlorine bleached paper is the next best environmental option.

Producing recycled paper involves a lower energy consumption than virgin paper – around 28 per cent less according to a study for the European Commission (Environmental Resources Limited 1985). This is because most of the energy used in paper-making is in the pulping required to turn wood into paper. Recycling paper also makes sense because by using waste paper to produce new paper, less waste has to go into landfill sites.

Producing recycled paper involves one major process that is not needed for virgin paper. This is the removal of ink and other items (e.g. wax, paper clips etc.) from the waste paper. Many of the de-inking processes and equipment used have left a lot to be desired, but through increasing pressure from the National Rivers Authority and water authorities in other European countries, standards are improving. Compared with the impact of dioxins from bleaching virgin pulp, however, the impact of these processes is much less significant.

To sum up, using recycled paper and recycling your waste paper are the best environmental options because they reduce the waste of resources, avoid the need to plant forests in areas where they are not suitable and help reduce pollution (through lower use of chlorine) and energy use.

OTHER MATERIALS

There are considerable environmental benefits in recycling other materials too.

Steel cans

Around 12 billion steel cans are thrown away each year and only one billion are recycled (40 per cent of all drinks cans and most food cans are made of steel). Cans can be collected in the 'Save-a-Can' skips many of you may have seen at supermarkets, but also by magnetic separation at local authority waste centres.

British Steel are planning a new site for reprocessing steel and so are keen to expand the volume of cans they collect.

Aluminium cans

Two billion aluminium cans are used each year and around 60 million of them are recycled (over 50 per cent of drinks cans are made of aluminium). Aluminium is a very valuable material – merchants typically pay around lp per can – and so collection of these cans is popular with charities, the Blue Peter annual appeal, etc. Making new aluminium cans from virgin materials is highly energy-intensive whereas using recycled cans cuts this energy use by 95 per cent. The aluminium industry has invested in a large new plant for reprocessing aluminium and thus the market for these cans will remain strong.

Glass

This is the material with the highest recycling rate in the UK – around 26 per cent – due partly to the fact that bottle banks have been around for a long time and most people have one nearby, but also to the high level of recovery from businesses. By using recycled glass, up to 25 per cent of energy can be saved. The glass industry plans to expand the current 6,500 bottle bank sites to 10,000 by 1995. Of course glass bottles do not all have to be recycled – some can be re-used. The best known example of this is the milk bottle, with each bottle being used an average of 20 times. Other examples are beer and soft drinks bottles collected for re-use from pubs and restaurants.

Plastics

Plastics present difficulties for recycling because there are so many different types. However, there are now some pilot schemes around the country to collect different types of plastic. Perhaps of most interest to colleges would be the scheme to collect the plastic cups that are used in drinks machines or water fountains in many companies. Production of plastics from virgin materials is energy-intensive, so recycling plastic also makes sense in terms of energy saving.

Kitchen wastes

These represent a large proportion of domestic and catering wastes. Years ago it was common for farmers to collect food wastes from commercial kitchens

for feeding to pigs, but as the costs of labour and transport and concerns about hygiene have increased, this practice has died out. However, used cooking oil is still frequently collected from commercial kitchens to be recycled into industrial oils.

WHAT CAN YOU DO?

Waste reduction

The first step should be to look at ways of reducing waste, as it is better for the environment and for your company's bottom line if you do not create waste which then has to be recycled, re-used or just thrown away. Some obvious (but frequently forgotten) ideas for offices and colleges are:

- use double-sided photocopying whenever possible – and make sure that all staff using photocopiers regularly know how to do this. We frequently come across companies with wonderful, high-tech photocopiers that will do double-sided copying at the flick of a switch – but only one member of staff knows which switch;

- make departments and sections responsible for their own photocopying budgets, so that they have a financial incentive to use double-sided copying as well as managerial exhortations to them to do so;

- use waste paper for notepads;

- re-use envelopes for internal circulation;

- make better use of noticeboards rather than circulating copies of all non-urgent memos and other circulars to all staff;

- review the need for computer print-outs and other circulated documentation from time to time. It is all too easy to go on printing out a regular 50 page report for the same 10 people who have received it for the last two years – do they all still want it; do any of them use it?

Options for recycling

Office paper is the most obvious thing to recycle in most companies and colleges, and there are hundreds of paper merchants all over the country who

specialise in collecting such paper from offices. Unlike the situation with newspapers and magazines, which are in oversupply at the moment due to our limited mill capacity to reprocess them, most of the mills still want more good quality office paper.

The best papers to separate for collection are white photocopying and letterhead paper and computer paper. Prices vary from region to region and with fluctuations in the market, but at present computer paper typically fetches a price of around £60–90 per tonne and office white paper around £20–30 per tonne. Printers' off-cuts (for those of you with print rooms) are particularly valuable – current prices are around £80–100 per tonne. Mixed waste paper (e.g. including envelopes and coloured paper as well as white and computer paper) is not very valuable – some merchants may pay £5–10 per tonne, but many will only offer to take it away free of charge if they are also collecting other, better quality paper from you. The amount offered by waste paper merchants will also depend on the amount of paper you have to be collected.

You need to give some thought to the system you set up in offices to keep the paper separate – is everyone to have an extra bin at their desk; or are you going to have central bins for paper, serving a number of desks? In some cases it may be better – at least for a trial period – to collect paper solely from areas where a lot of good quality paper is generated, e.g. a computer or print room. Other matters to consider are:

- staff education and motivation: staff need to be clear about what paper to put where and about the need to keep food items, etc., out of paper bins. They also need to be kept interested in the scheme if it is to work for longer than a few weeks. Letting them know how much has been collected helps, as do schemes to donate the money raised to charities;

- briefing the cleaners: there is no point in office staff separating paper if the cleaners then mix it up with the other rubbish. Cleaning staff need to have the scheme explained to them and it should have their support. In particular, they will need reassurance that it will not involve extra work;

- storage: merchants will not collect very small quantities, so you need somewhere dry to store the paper. You may also need to consider whether there is any fire risk.

Recycling good quality office paper should, at worst, cost you no more than disposing of paper with other rubbish (as you will save on waste disposal costs) and, at best, could produce savings through the income generated, once you have paid off any capital investment in bins, staff education, etc.

Photocopier and laser printer toner cartridges can now be recycled. There are several companies who will collect used cartridges, then recondition, refill and sell them at a considerable saving on the price of new cartridges – typically £10–15 per cartridge.

Plastic cups: one option is to stop using these and go back to china cups – even taking into account the energy and detergents used for washing china cups, it would still be beneficial in environmental terms. However, this may not be practical. There is a Save-a-Cup scheme which now offers a way of recycling plastic cups, but you would have to get staff to return the cups to a central point (e.g. a bin by the vending machine) in order to make them easy to collect.

Drinks cans: local scrap merchants may be willing to collect these but the disadvantage is that they will only usually collect quite large quantities, and a tonne of cans takes up a lot of storage space. If you are in a good location, e.g. near a shopping centre, or can get together with other institutions and/or businesses, you may be able to persuade Save-a-Can or the local authority to organise and service a can bank for you (note that you may have to pay the capital cost of the bank). Remember, however, that this would take up a car parking space. A better option might be to see if a local charity would pick up cans from you. Many charities will do this, particularly the wildlife trusts. Again, you would need to get staff to return cans to a central point. A volunteer to supervise the scheme is also a good idea.

Bottles: as with cans, you may be able to get a bottle bank if you are on a good enough site, via your local authority (you may have to pay the capital cost of the bank).

Other wastes: for most colleges and companies, other wastes are not usually generated in sufficient quantities, or there is no market for them. There are more likely to be ways of reducing the wastes, e.g. changing from disposables to re-usables; limiting the use of one portion packs. For plastic wastes, advice can be sought from the British Plastics Federation by sending a sample of the type of plastic: they will tell you if there is a market for it.

USING RECYCLED PAPER

Recycled paper has come a long way from the poor quality, grey paper many people first think of when they hear the word 'recycled'. There are now recycled papers for most business uses. However, it is important to know what you are buying as there is no universally agreed classification system for recycled paper, so that confusion can – and does – occur. Paper-makers have always used internal waste paper such as unprinted off-cuts (mill broke) and wrappers, which are classified as pre-consumer waste. This is good practice, but it is nothing new and does not contribute to reducing waste generated at the post-consumer stage. So what you should be looking for is paper containing post-consumer waste – that collected from offices, homes, retail stores, etc. Paper containing 100 per cent post-consumer waste tends not to be of the best quality, so you will probably want to look for one containing 50 per cent or 75 per cent of post-consumer (printed) waste mixed with virgin fibres and/or pre-consumer (unprinted) waste.

For uses where a high grade of paper is not required (e.g. toilet paper, photocopying or computer paper for internal use) you could look for paper containing a higher proportion of low grade waste (newspapers and mixed papers, as opposed to that made from used office white paper).

All major manufacturers of recycled paper made for business use can provide details of their brands' specifications and the Waste Watch guide, **Paper, Paper!** (1991) contains a full list.

Before switching to recycled paper you should always try it out on your office equipment – photocopiers, laser printers, etc. All reputable suppliers will provide quantities for test. Recycled papers will run perfectly well on most office machinery, but it is a question of getting the right paper for the right machine and making any adjustments necessary.

Recycled paper need not necessarily cost any more than virgin paper, although people usually think it is going to be more expensive. However, you may have to accept a paper that looks considerably different from the paper you have been using. Typically, companies find that they can make savings on photocopier paper for internal use, if they are prepared to accept something of lower quality, and that this compensates for any higher costs incurred in buying high quality recycled paper for external use.

Colour printing on recycled paper does present special problems and many printers are still unused to using it. There are now gloss recycled papers available, but in limited supply, and it often requires a re-think of printing styles. For some purposes, therefore, virgin paper will still be the only option and in such cases you should look for a paper that has not been chlorine bleached. Specialist advice is advisable in this area and there is a very good, detailed printers' manual now available from Anderson Fraser Print.

FURTHER ADVICE

More detailed information on using recycled paper and setting up office paper collection schemes is contained in the Waste Watch office guide, **Paper, Paper!** (£8.95 including postage, from Waste Watch – cheque with order). Waste Watch also produces many other publications on recycling, a full list of which is available. Members of Waste Watch receive a regular newsletter. If you require more individual advice, Waste Watch offers a consultancy service, ranging from a quick, low cost review and action plan, through to detailed advice on developing a corporate policy on recycling, the use of recycled paper (including organising paper tests), help in setting up office collection schemes and staff education programmes, assessing the costs and benefits of the options available, etc. In-house seminars and training sessions can also be provided for specialist (e.g. print room, purchasing, facilities) and non-specialist staff.

Waste Watch, 68 Grafton Way, London W1P 5LE, Tel: 071-383 3320

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Chapter 3

How to save on energy costs and consumption: the Middlesex University experience

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INTRODUCTION

In this chapter I aim to show that it is possible to make major – and I mean major – savings on energy costs and consumption in educational institutions. I use my experience at Middlesex University to demonstrate this.

In 1982, Middlesex University (then Middlesex Polytechnic) spent £976,000 on electricity, gas and oil. Water was separately accounted, on rateable value. The university used 65.46 million kilowatt hours in 1982/83. If you took the £976,000 and added on annual increments up until 1988/89, we would have been paying over £1.6 million for energy. Our actual bill for that period was £757,000, and that now included all the water as well. Consumption was down to 54 million kilowatt hours. Furthermore, we had almost doubled student numbers and also nearly doubled the amount of space we use. Yet we had saved about £1.6 million on energy costs and reduced consumption considerably. I feel that this kind of saving is possible in nearly all of our educational establishments.

BACKGROUND

Middlesex University is a very scattered institution comprising six main sites and many smaller buildings spread over a hundred square miles of north London.

Some years ago I was seconded to the university as an engineering consultant at the Bounds Green site. At that time, the site comprised a very large warehouse building which was being phase developed into an engineering centre, along with an integrated office block of five floors. I arrived during phase four when two bays of the warehouse and two floors of the office block were occupied.

Having worked within the complex for a year or so, I began to worry about the enormous waste of energy that was going on. I used to be a marine engineer, and at sea you do not burn any more fuel than is absolutely essential. If a ship is running 24 hours a day for three years with the engines never going off, then one litre of fuel per hour burnt in excess of what is actually required amounts to a lot of fuel. One should look at buildings in exactly the same light: what does this building actually cost to run, and does it need to run as it is being run at the moment. But how many people actually know the full energy expenditure for their particular site or institution, or exactly how all that money is spent?

ENERGY SURVEY AND PROFILING

Having become concerned, my first step was to look at energy use at the Bounds Green site. I started with electrical energy. In 1982/83 we used 301,632 kilowatt hours just in the office block. I produced a graph and the energy spend was way up at the top. Then I undertook an energy survey and managed to reduce the energy profile considerably even in the first year.

The first thing necessary was to establish how the energy had been used on a monthly or weekly basis over as many years as it was possible to get information for. I got the electrical energy bills for as far back as the finance office could supply to give myself a good average baseline on which to work.

Now a full energy survey is not quite as simple as it appears. For any institutional building it also requires the work to be done over whole weekends and throughout the night, because it is surprising how much energy is being used then. In the case of Bounds Green, at 4.00 am the security guard unlocked every door and turned on all the lights. It took him an hour to go round before the start of occupational time. So the lights switched on by the security guard were never switched off until the following night – even if offices were unoccupied all day. This included lights left on in toilets, bathrooms, etc. Having discovered that the cleaners were responsible for a third of the total energy spending on site, we altered their hours of work and they were firmly instructed to turn lights on

only as required and switch them off as soon as they had finished. The energy bill was reduced by 100,000 kilowatt hours by doing this.

In looking at the site, it was necessary to pay attention to every detail. For instance, in the office block there were large open plan areas with block switching at one end – 24 switches on a block. Even the most intelligent people there had difficulty finding the switch relevant to their area. In consequence, the lights were never switched off. So the block switches were replaced by localised switching.

Certain practices seemed inexplicable. For example, the science labs had three and six kilowatt furnaces for metallurgical analysis, left on continuously, with the doors open. I wrote to the dean of faculty and the response was 'oh, you're only talking about a few kilowatts'. The important point here is that this kind of attitude – including from people in positions of seniority – is typical.

However, having cut down energy consumption by 100,000 kilowatt hours and reduced the electricity bill from nearly £13,000 to £9,000, despite an increase in fuel costs, this proved to the establishment that energy conservation was a worthwhile thing and I was asked to take a survey of the whole of Middlesex University.

EFFECTIVE ANALYSIS

In order to effect change in an institution, it is necessary to prove to the head of department or senior manager exactly what is actually happening in energy use terms. This is why the depth of survey and analysis I did was so important and useful. I use graphs for every month and year because I am required to communicate with people on various sites and I also go around the country showing people what we do.

If you systematically produce monthly consumption graphs of gas and electricity use for each site, building or metered area, you will soon get a complete profile of what is happening. Now I personally prefer to enter all the figures manually and not use a computer for number-crunching at all. As far as I am concerned, these figures are a tool in my toolbox, my basic analytical tool. You should at least start off entering figures by hand until you begin to understand what all these figures are that are being entered. The danger with computer number-crunching is that you have no feel for the calculations, their outcome and any

discrepancies. It is hard work producing graphs and inputting all the figures – I have details of every penny spent on energy right across the institution since 1982/83. But when I input a number, I know immediately if something is wrong. Then I check the bills – and there have been overpayments. If the bills and the meter readings are right, I know there is something going wrong on a site.

For instance, last year I suddenly saw a steep climb on a graph. There was a £5,000 overspend for one month, and the maximum demand penalty clauses for the rest of the year actually cost the university £7,000 over the course of the year. And the reason? The pottery department on one site held a pot-throwing competition to throw as many pots as they could in 24 hours and then sell them to raise money for charity. So every pottery kiln was on at full blast for the 24 hours, and hence the surge in consumption. It cost the university £7,000 and they sold 700 pots at £1.50 each.

ENERGY CONSERVATION AT ANY PRICE?

The above example illustrates the need for careful thinking as well as a full survey and analysis of the information.

It is also easy to get carried away with the environmental ethos. I know of a university in the north of England that is proposing to put solar cladding on one five storey building at a cost of £700,000. They have seen figures to suggest that every square kilometre of commercial building can generate an average of 100 megawatts of power between 9.00 am and 5.00 pm throughout the year. But on £700,000 invested in the bank even at current rates you would earn considerable interest.

By comparison, the electrical demand for the whole of the Enfield site at Middlesex University is £40,000 for a building of eight floors, a site covering approximately 150 acres. I could not justify the huge spending on solar cladding for that building given the actual energy costs. It is simply not cost-effective.

The same applies to e.g. double-glazing and cavity wall insulation. They help with energy conservation, but you get no true economic benefit from them, except maybe over the very long-term. The energy consumption and use of finite resources during manufacture, transportation and installation are also

factors as well as cost. Defining environmental friendliness is not always as straightforward as it might seem.

However, there are many sensible, practical and cost-effective measures that can be taken to reduce energy use and costs. I have already highlighted some examples, and there are many more.

LIGHTING

The architectural lighting that was being used at Bounds Green consisted of around 450 tungsten halogen lamps at 400 or 500 watts each along the malls and corridors. They cost £55,000 per year to light and were on 24 hours a day as security lighting. We had them removed and replaced by 125 watt MBF lamps, made specifically for us by Thorn. Installation costs were £24,000 using existing wiring, but we saved £36,000 on running costs in the first year.

Across the whole university the security lighting used to be 1000 watt tungsten halogen lamps, and every one of them was replaced by a 70 watt Son lamp. The reduction in consumption achieved by these measures is obviously enormous, and the lighting for security purposes is actually better.

The lack of effort in energy conservation is often viewed with real or feigned ignorance. For example, it is a fallacy to say that it costs more in energy terms to switch fluorescent lights off than to leave them on. The facts are these:

> When a standard fluorescent lamp is switched on, a ballast unit charges and discharges in one fiftieth of a second. Assuming a single 120 watt lamp, for one fiftieth of a second the lamp will consume 1.3 amps or 0.08 watts as on striking the lamp is at mains voltage. Having struck, the run voltage is reduced to 149 volts consuming in total approximately 150 watts per hour or 0.038 watts per second. It can therefore be shown that in the first second the lamp will consume 0.1584 watts and for every second after it will consume 0.038 watts per second. Within five seconds the lamp has consumed more energy than the start load.

We have now changed all the fluorescent tubes to ordinary switch start lights across all sites, and this has saved a lot of money.

HAND DRYERS

We changed all the roller towels to hand dryers. On the face of it, this may not seem logical, but when you examine the actual logistics, the problems with roller towels become apparent. You cannot tell when a roller towel needs changing until it has actually run out, except by opening the case. So you have to change them piecemeal as required. This is very labour intensive in terms of caretaker hours, and we had 96 roller towel units.

I negotiated a very good deal with a firm to supply us with hand dryers throughout. This cut £22,000 off the laundry bill for the roller towels (not to mention the energy used in doing the laundry), saved on storage and transportation, and also saved innumerable hours of caretakers' time.

POINT OF USE WATER HEATERS

At the Enfield site at Middlesex University, there was a district heating and hot water service. Enfield is a large site and the hot water on the distribution service was being pumped around the system. This pump, running 24 hours a day, was consuming about 33 kilowatts. Unfortunately, we were also experiencing a 40C transmission loss in the system, which was a sheer waste of energy.

So I got rid of the whole lot and instead installed around 45 point of use water heaters throughout, in all the toilets, catering areas, etc. You would think that by installing so many electric point of use water heaters that the energy demand would increase, but in point of fact, the total electrical demand on the heaters was less than the energy consumed by the pump for the old system.

For heavy hot water use areas, such as refectories and kitchens, we have given them their own point of use water heaters, but larger ones. This also makes their hot water use self-regulating because they cannot get any further supplies from anywhere else. To cut down on hot water wastage in these areas, which was considerable, we removed the spill pipes from the deep sinks because the taps were left running continuously. Now they have proper plugs for the sinks.

Point of use water heating also gets over the legionellum problem with distribution of water. This is because instead of a cold water down service, they

use mains cold water coming straight into the water heater, and mains water for temperature dilution for outflow.

The water boilers operate at their most efficient when boiling at their maximum temperature, and these can run at 90C because the outflow temperature is controlled via a mixer valve to 40C. That is the maximum temperature for water coming out of the system. There is one timed spray tap on each hand basin, which saves waste and also cuts out a lot of maintenance problems.

In London and the southeast we have severe limescale problems and you are not normally advised to heat water above 60C. So on each of the water heaters we put a magnetic treatment unit, which de-ionises the water to prevent limescale. The benefit of using scale eliminators has been shown clearly at the Enfield site because one particular area's water heater did not get a magnetic treatment unit fitted as we had run out of funds. Some 18 months later, the piping was completely blocked by limescale, whereas all the others were still running perfectly.

TARIFF NEGOTIATION

Tariff negotiation is something we are all capable of. There are companies who will negotiate for you, but at a price. They charge an annual fee as a retainer and then they charge up to 50 per cent of the savings on top of that. It is better to avoid tariff negotiators. If you write to any energy supply board in the country, they are legally required to issue you with their tariff statement. The only advantage a tariff negotiator has is to be in receipt of this information a fortnight before you can get it.

You are entitled to call in any gas or electricity board and ask them at what price they will provide a supply. They will need as detailed energy consumption information as you can supply, so that the more complete your record (e.g. month by month consumption figures, use at weekends, etc.), the better chance you have of reaching amicable terms with the supplier.

For electricity supplies, on request, your local board will perform an analysis of electrical use, over e.g. a week or a month. This service is free of charge. The board will install a systems demand analyser in order to perform a detailed analysis of electrical use on the site. Ideally, the analysis should take place at the busiest time of year. I bought a systems demand analyser for use at Bounds

Green, and it paid for itself over the first weekend because I discovered that our power factor was down to .79. Putting in power factor correction to bring it up to 1 saved us £12,000 in the first year.

To obtain gas supplies you can use any of the gas boards or an independent offshore supplier. It is worth bearing in mind that for any installation work done, the local gas board charges nothing for installation of infrastructure up to the meter. If you switch from your local gas board to a different area board – which you are entitled to do – there will be penalty charges for infrastructure and distribution costs. The gas is supplied via a nationwide pipework distribution system.

If you use an independent gas supplier, you will be charged for all infrastructure work, so although you might save 12 per cent on the gas bill, the infrastructure costs may be considerable.

You need to be very careful before entering into any agreements with any supplier that all costs are clearly worked out.

If you have an institution spread across several sites, you should still be able to negotiate an across-site tariff for gas and electricity, as a single accounting unit. At Middlesex University I have aggregated all our sites into one gas supplier contract with Eastern Gas, even though one of the sites comes under a different gas board. The negotiations may be difficult, but it is possible – I have done it.

However, it has not yet proved possible to negotiate an aggregated tariff across all sites for electricity supplies, but the process of negotiation continues. At the Bounds Green site I was eventually able to negotiate a single contract for the three meters within one building. However, I had to go to OFFER, the electricity watchdog body, to achieve this. So if you are in dispute over tariff negotiation you can have recourse to OFFER or OFGAS for gas supplies.

One effect of incorporation has been the disaggregation of colleges from the centralised accounting of the local education authority. Each further education college, sixth form college (and also opted-out school) now operates as a separate accounting unit. This is costing the colleges thousands of pounds extra.

HEATING SYSTEMS AND BOILERS

With heating and hot water systems, it is all too easy to fall into the trap of having an excessive number of boilers. How many college boiler rooms have three boilers, all running at once? If you ask the maintenance staff why, the answer is likely to be 'well, they're there'. After all, who would install all those boilers if they were not absolutely necessary?

The problem is partly that there is no incentive for consultant engineers to design energy conscious buildings, because they get a percentage of the total contract value. So they have no inducement to install one efficient boiler with the controls set to make sure that the building operates properly, thus reducing the energy requirement by several million kilowatt hours per year. Instead, the reasoning is that you install one boiler which will cope with the standard temperature range in the UK of -1C to 20C and be able to operate the building between the statutory minimum for seated work (16C) and the maximum temperature (now 19C). But the problem with this is that the temperature sometimes goes below -1 C. So therefore you need a second boiler to cope with that eventuality, and now you are in the trap. The next thing is, you will be told that you need a third boiler as a standby. The heating system is now fine, but then for the summer, you need another boiler just to run the hot water. This is how this type of reasoning can easily lead to having four boilers in a boiler room.

Having got three boilers for the heating, the usual practice is to have them all running at once, because the attitude is likely to be 'what's the point of having three boilers if they are not all running?'

The fact of the matter is that two or three boilers running in tandem in this way do not operate effectively. There is no control over the sequence of firing and cycling. The flow and return of water does not operate through the system efficiently (i.e. as it does in a single boiler domestic system) because too much unheated water goes through the downside boilers with the result that it becomes impossible to reach the required flow temperature. In recognition of this, the government legislated in 1982 to stipulate that:

> Where boilers installed have a combined load of more than a hundred kilowatts and you have boilers in tandem, the downside boilers must have valves on to shut down the flow to those boilers.
> (Heating (amendment) control water act 1982)

If you have two or three boilers, they should have motorised valves to close off all but one boiler until that one is absolutely at capacity, and only then should you open the valve for the second boiler. Unfortunately, this is not generally known and many systems still operate in the old way.

The purpose of the boiler is to heat the water that flows through it, and to do that efficiently the boiler has to be clean. A deposit of one sixteenth of an inch of soot on the inside combustion chamber surfaces is sufficient to reduce boiler efficiency by a quarter. An analogy is that of using an oven glove to remove a baking tray from an oven; the thickness of the cloth is enough to reduce the heat so you can get hold of the tray. The deposit of soot inside a boiler has the same effect.

For a fire to burn well, it needs heat, oxygen and fuel. If you remove any of those, the fire goes out. If you reduce any of them, the fire does not burn so well. Oxygen flow to the fire in a boiler is reduced if there is dirt in the stacks and the flue passes. An obscuration meter can be fitted at the bottom of the flue, to measure the amount of dirt being transmitted up the chimney.

On my first rounds of the university campuses I went to the boiler room at one site, and there was an obscuration meter there reading 100 per cent. I was told it had never worked. Also in the boiler room was a balancer box. This is a box on the chimney so that when the actual vacuum caused in the chimney through atmospheric conditions is greater than the amount of air supplied from the boiler, the balancer box opens to allow air to fill the vacuum instead of drawing heat out of the boiler. This balancer box was screwed shut. When I opened it, I found two and a half tons of soot in the chimney. The obscuration sensor was buried, so the 100 per cent reading was genuine.

At another site, I had a flue gas efficiency check done. In a properly burning furnace, the oxygen is burnt up and a certain amount of carbon monoxide is expelled, plus a little bit of oxygen. The flue gas temperature is critical because you do not want too much heat going up the chimney. In the case of this particular site, the maintenance work was out to contract with the local authority and the figure they gave me for the flue gas efficiency check was 82 per cent. I knew this to be impossible because the boilers dated from the 1920s and were coal-fired, converted to oil. So I opened up the flue pass boxes and you could not have got so much as a pencil down through the flue passes. We filled up 22 dustbins of dirt from out of those boilers. But if you speak to outside contractors about this, they will tell you that they are only responsible for the bit on the

front, the burner. You can still achieve a high figure for flue gas efficiency even with the boiler in the state this one was, because the burning efficiency of the flame is what is measured, not boiler efficiency. To get a high rating for the flame you can simply adjust the fuel supply.

It is most important to check boilers very thoroughly, as the above examples show.

At Middlesex University we have now ripped out all the old triple boiler systems, and replaced them with single, smaller, fully condensing boilers. These operate more efficiently and it is economically sound to have smaller ones. One result has been to free up large amounts of space. We now have 10 sizeable areas with a boiler room in one corner and all the rest of the old boiler room space is now used for workshops, stores, etc. There is another stage beyond this currently in progress at Middlesex described below.

RADIATORS AND RADIANT HEATING

A radiator is designed at a specific kilowatt loading with a 9C differential across the radiator. Now a situation common in many buildings is to have one side cold and one hot, or a difference in temperature between floors, etc. What happens where a building is colder on the north side than the south, for instance, is that the heat given up in a radiator the north side is greater than that given up on the south side. So the differential is then greater than 9C.

Radiators should have a thermocouple on the pipes at each end, and a lockshield valve, which is there specifically for flow control. If you then adjust the south side radiators to get the 9C differential, the system will balance out across the whole building, because that is what it should have been designed to do. It will also save on heating bills.

The heat from a radiator is given off in straight lines, as with light. You only need a thin film of paper in front of the radiator to stop the heat entirely. Placing wet towels on a radiator is effectively lagging it, as is obstructing the radiator with furniture.

For large lecture halls, refectories, gymnasiums, etc., which are notoriously difficult to heat, the use of ambirads is a very good solution. Ambirads are localised, gas-fired, radiant heaters. They are suspended from the ceiling and

consist of a long tube with a stainless steel reflector over the top. They have a burner unit, an exhaust fan and a radiant thermometer on the wall with a set required temperature. This type of radiant heating only heats solids – people and furniture, etc. – but not the air.

WATER DISTRIBUTION

On one site at Middlesex University we had a district heating scheme. Underground losses on the hot water service and central heating were 2000 gallons of primary water an hour. The boilers were making up 2000 gallons an hour, and the water was leaking out underground, flowing down the side of a hill and into a lake (which never froze in winter). Elsewhere, observation was enough to show what was happening; there was a tell-tale swathe of tall, light green grass right across the main quadrangle, as a result of leaking boiling water underground. Some of the pipes were in such poor condition that you could read a newspaper through them.

To find the rate of water loss, you need to check the central heating header tank. If you mark the level on the side of the tank, then mark it again after an interval of time and you can calculate how much water is being lost. The results may well be surprising. Such periodic checks are really necessary for water conservation. It is also possible to use acoustic methods to detect water loss under paved areas.

The excessive underground water loss exacerbated our problem of lime scaling, with the make up of water accelerating the process. I have now completely done away with the district heating system.

A further point about water distribution is that we are doing away with the large water tanks around the sites. They dated from the days of formal teaching methods, with certain periods of intensive water usage according to the set timetable. With more modern, interactive teaching methods, the demand pattern is different and not so concentrated on particular times. Furthermore, if the water is not drawn off the tanks sufficiently quickly, as in the summer vacations, there can be the threat of legionellum and other harmful bacteria.

By cross-connecting from the mains supply coming into the tank to the cold water down supply coming out, the tanks are eliminated. Bye-laws may stipulate that there has to be a break between the mains and the point of use, but a double

check valve would overcome that. You also need an air break where hoses are being used. At Middlesex we are using this system of cross-connection to get rid of redundant tanks and, coupled with the point of use water heaters, this means we will have no more legionellum problems.

THE NEW HEATING SYSTEM

Having checked all the systems, cleared the anomalies and replaced the old boilers with modern fully condensing boilers, we have embarked on the next phase, which is to do away with the boiler rooms altogether.

One good reason for this is to do with problems with large pipework systems, such as those from the 20s and 30s. Nowadays, there are not the maintenance staff trained in the repair and upkeep of such systems, nor can you get the tools and parts. So our motto now is:

> If you can't buy it at B&Q, it won't do.

We are now installing a series of totally independent systems, splitting the buildings into zones. With this set-up, you can use the zoning to allow for variations in temperature between the north and south sides of a building.

Each system is fully integrated, with a standard, domestic wall-hung boiler of 60,000 btu, a pump, a pressurisation unit, and 15-20 radiators on each system. We have used Holden alu-rads – aluminium radiators – throughout. The speed of response on a modern three kilowatt radiator (which takes about one and a quarter litres of water) is very rapid. Each radiator has a thermorad valve to adjust temperature, a draw off cock and easily dismountable fixings. This means that each radiator can be shut down and drained off separately, and taken off the wall easily, with no need for expensive and wasteful draining and refilling of the whole system. The improved controls also give much greater versatility over the systems.

So far we have done about six buildings in this way, and I firmly believe that this is the way forward with institutional heating systems.

Cost differences

The cost comparisons are interesting. A small commercial boiler costs £6 – £8 thousand. For a larger one (one and a half million btu), the cost is about £13 – £15 thousand, plus about the same again for all the plumbing. The boilers we are now using on the new systems cost £400 each. The installation is very simple. Each of the independent systems costs £2,500 – £3,000 to install, including the radiators. Not only that, but you do away with water distribution costs, because these are sealed systems, they just use a mains fill pipe.

To take the specific example of Bounds Green, when I started, there was already 21 million btu worth of boiler capacity installed. A new boiler house had been built and another 3 million btu boiler was due to go in. At that time we used over 211,000 therms, costing £76,000 (without the new boiler house). We have now reduced the actual boiler consumption from 211,000 to 78,000 therms. The cost this year was £26,000.

Maintenance costs are also much cheaper. Instead of spending £1,000 per year on a maintenance contract for a commercial boiler system, by buying domestic boilers we can actually use the gas board's gold star maintenance agreement at £40 per boiler per annum.

CONCLUSIONS

I have demonstrated how careful analysis, logical thinking and thorough inspection can lead to great savings in energy use and costs. I have also suggested some specific changes that can be made in e.g. lighting, heating and water systems to improve efficiency and make savings.

Circumstances vary in institutions, but I am sure that by taking the approach I have outlined here, it is possible to make considerable savings on energy use and expenditure.

Chapter 4

Environmental management and educational institutions

Rick Kelly
Chairman
Environment and Pollution Standards Policy Committee
British Standards Institution

INTRODUCTION

This chapter discusses the possible impacts on educational institutions of:

- British Standard **BS 7750: Environmental management systems**;
- environmental standardisation programmes, which are being undertaken internationally;
- the European Community's eco-management and audit scheme.

THE PREPARATION OF BS 7750

In mid-1990, the British Standards Institution (BSI) received from some of its members' requests for guidance on what needed to be done to assess, improve and demonstrate the environmental performance of their organisations. Consideration by a BSI task force, of which the author was a member, showed that:

- an environmental management systems standard needed to be prepared, covering the needs of all types of organisation;

- this standard needed to be compatible with **BS 5750: Quality systems**;

- to be truly effective the new standard needed to be produced quickly, 12 months being the target period for publication.

BS 7750: Environmental management systems was published in March 1992. Its foreword said:

> This British Standard is issued subject to review by the technical committee responsible for drafting no later than 1 September 1993 to facilitate pilot application. At the time of the review, changes will be made where required in the light of the experience gained or to reflect changes to the draft European Community eco-audit regulation (Version 3, December 1991) in the intervening time from the publication of this standard. [NB: this draft regulation has now been agreed]

The schematic diagram in **Figure 5** shows the stages in the implementation of an environmental management system (EMS). One of the annexes to the standard is a guide on EMS requirements. Another shows the links to **BS 5750: Quality systems**. A third gives the links to the draft eco-audit regulation.

It is not possible to give a précis of the standard as it needs to be read in its entirety. However, there are some aspects that need highlighting.

1. The standard does not itself lay down specific environmental performance criteria.

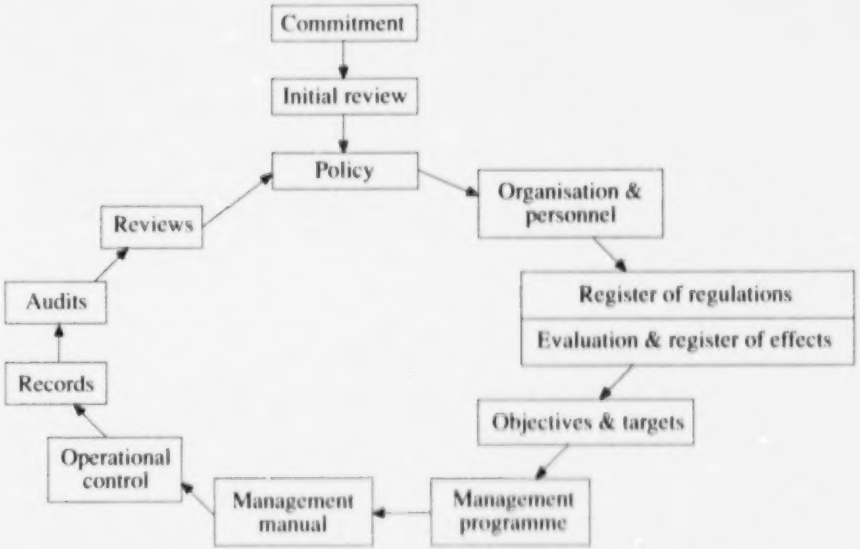
2. An implementing organisation's management shall define and document its environmental policy, which the standard defines as:

   > a public statement of the intentions and principles of action of the organisation regarding its environmental effects, giving rise to its objectives and targets.

   The terms 'environmental effects', 'environmental objectives' and 'environmental targets' are defined in the standard.

3. The organisation's management shall ensure, *inter alia*, that this policy includes a commitment to continual improvement of environmental performance.

Figure 5: Stages in the implementation of an environmental management system



The standard also makes recommendations about the setting of objectives and targets which shall meet all legislative and regulatory requirements and shall take into account the views of the 'interested parties' which are defined in the standard as:

> Those with an interest in the environmental effects of an organisation's activities, products and services. These include those exercising statutory environmental control over the organisation, local residents, the organisation's investors, insurers and workforce, customers and consumers, environmental interest groups and the general public.

Experience has shown that the decision to publish the standard quickly was correct. Since work began on its preparation, events have moved rapidly. A reading of the popular press shows that statutory environmental control is becoming ever more stringent and the penalties for infringement more substantial. What may be less apparent is that merely complying with the law may not be sufficient. Increasingly, some interested parties are demanding environmental performance beyond regulatory requirements. This need is reflected in the requirement in BS 7750 for an organisation implementing it to undertake a programme of continual improvement.

Failure to effect such a programme may lead to:

- difficulty in obtaining investment and insurance;
- difficulty in gaining acceptance for the operation of the organisation's facilities;
- loss of customers.

Events at international level have also emphasised the advantages of rapid preparation of the standard. These can be considered in two parts: those initiated by the international standardisation bodies and those initiated by the European Commission.

Late in 1991 (mid-way through the drafting of BS 7750) the International Standards Organisation and the International Electro-technical Commission decided that a joint input should be made to the Rio conference in June 1992.

This was to describe the role of standards-making in promoting improved

environmental performance. Groups were set up to deal with the following topics:

- environmental performance evaluation,
- environmental aspects in product standards,
- life-cycle analysis/assessment,
- environmental management systems,
- environmental labelling, and
- environmental auditing.

Two of these – environmental labelling and environmental auditing – are likely to be of special interest, giving as they do methods of indicating in a readily assimilable form an indication of the environmental performance of an organisation.

Various labelling and auditing schemes have been proposed. Of immediate interest in the UK are those introduced by the European Community for:

- eco-labelling, and
- eco-management and auditing.

The government has appointed a board to deal with eco-labelling in the UK and procedures are being formulated for implementing the eco-management and audit scheme. This scheme should be fully operational by April/May 1995.

THE ECO-MANAGEMENT AND AUDIT SCHEME

The details of this scheme were published in the **Official Journal of the European Communities** in July 1993. It aims to encourage companies to undertake positive environmental management, including regular audits, and to report to the public on their environmental performance. Member states are required to set up arrangements for the scheme, which will initially be targeted at companies in the manufacturing, power and waste disposal sectors. They

may also extend the scheme on a pilot basis to other sectors. Participation by companies will be voluntary but once a company joins, it must comply with the requirements of the regulation if it is to retain its registration, which will apply to individual company sites. The following is an outline of the commitments entered into by those joining the scheme:

i) a company wishing to register any of its sites must first establish a company environmental policy which, in addition to providing for compliance with all the relevant environmental legislation, must include commitments aimed at the reasonable, continuous improvement of its environmental performance;

ii) once an environmental policy is in place, a company wishing to register a site must carry out a thorough environmental review of that site. In the light of the policy and review results, the company must introduce an environmental programme for the site. This will set out quantified objectives and targets to ensure greater protection of the environment at the site, together with the measures proposed to achieve those objectives. The site will also have to have an effective environmental management system for ensuring successful implementation of both policy and programme;

iii) the management system must be periodically audited. The audit will provide management with information on the progress in meeting the programme at the site; the effectiveness of the management system; and where changes might be necessary;

iv) once the initial review is complete – and at the end of each subsequent audit cycle – the company will be required to prepare an environmental statement, designed for the public, in respect of each site to be registered. This will set out information on the environmental performance of the site and details of the success in meeting targets as well as new targets for future improvements. The timescale for preparing the next report will also be included. The statement will have to be validated by an independent, accredited environmental verifier. A simplified statement containing updated information will normally be produced every year but only validated at the end of the audit cycle;

v) a full cycle of environmental audits at the site must be conducted at least every three years. The frequency of audit of individual activities

will depend on the scale of impacts. Audits, and the initial environmental review, can be carried out by internal auditors or external agents acting on the company's behalf. Auditors must, however, be independent of the activities which they audit and of the verifier;

vi) the verifier will check that the requirements of the regulation have been met and that the environmental statement is reliable and adequately covers all the significant environmental issues. It is not intended to repeat the audit process, nor make a judgement on the quality of the environmental performance reported. The public and other interested parties will be able to compare the performance of different sites and question apparently poor performance. Companies will have to maintain procedures for responding to communications from interested parties;

vii) each EC member state will have a competent body to maintain a register of sites. A site may be entered on the register once it has a validated environmental statement and the company has paid any registration fee. The register will be updated and published annually. Companies with registered sites will be entitled to use a statement of participation on documents such as annual reports or letterheads but **not** on product advertising or packaging;

viii) arrangements for accreditation and supervision of verifiers will be established by each member state. Applicants, organisations or individuals, will be assessed for their independence, objectivity and competence. A list of accredited verifiers will be published every six months. They will be permitted to work in any member state subject to prior notification and supervision under that state's system. The European Commission will aim to ensure consistency between verifiers in all member states.

ECO-MANAGEMENT AND AUDIT AND BS 7750

BS 7750 is not a substitute for the EC system. Rather, it will complement the scheme. Certification of a management system conforming to the standard will provide one means by which companies may seek to satisfy the requirements. Those wishing to register sites under the eco-management and audit scheme can choose either to devise their own environmental management system or to

use a national, international or European management standard, provided it has been recognised by the Commission. Following a review of BS 7750 in the light of its piloting and agreement to the regulation (referred to in the quotation from the standard's foreword on p 778), application will be made for it to be recognised by the European Commission for the purposes of the scheme. Having used this standard, a company would still have to conduct an initial environmental review, and prepare and publish a verified environmental statement.

Whilst recognising the role of BS 7750 in relation to eco-management and audit (EMA), it is important to appreciate the advantages its availability gives to organisations wishing to improve their environmental performance and communicate their improvements to interested parties. These advantages can be considered under three headings:

1. some organisations may wish to install an environmental management system without taking part in EMA even if they are entitled to do so. The standard is available for the use of such organisations;

2. the technical requirements of EMA are far-reaching and exacting. The standard mirrors many of these requirements and the current review of BS 7750 will ensure a close correspondence between the two. What the standard provides is help on how to meet the management system requirements. This should prove invaluable to many organisations;

3. BS 7750 has been subjected to a rigorous and extensive pilot programme covering about 40 industrial and other sectors, each with its own working group. No working group challenged the principles of BS 7750 or found it impractical to apply.

The status of the standard in its own right should, therefore, not be underestimated – particularly as an intermediate step in a process aimed at eventual participation in EMA. In the document **Consultation paper on the implementation of the EC eco-management and audit regulation and accreditation arrangements for certification to BS 7750** (Department of Trade and Industry and Department of the Environment 1993) it was stated that: 'the government believes that BS 7750 should meet the management systems requirements of the regulation', and that, '... a site complying with BS 7750 will have gone a long way towards meeting the requirements for registration under the EMA scheme'.

THE IMPACT OF SUCH ACTIVITIES ON EDUCATIONAL INSTITUTIONS

We can consider the impact of the above developments on educational institutions from two points of view: as operating units and as the providers of environmental education and training.

As operating units such institutions are likely to be under the same pressures as other organisations to improve their environmental performance and to be able to demonstrate that they are doing so. Such improvement needs to take into account not only the institutions' own operations, but also consideration of the goods and services they receive from suppliers and contractors. It could be financially advantageous to make such improvements. Already there is increasing evidence of organisations making substantial savings in their operating costs by adopting more environmentally protective operating styles. There are at least two other reasons for making similar operating improvements:

- there is a need to include in all teaching and training an increased content on environmental issues. It would be difficult for the institutions to have credibility in relation to their teaching and training practices if the precepts being taught were not seen to be put into practice by the organisations themselves;

- the existence of an environmental management system within the establishment would give students first-hand experience of being part of such a system. It will be extremely difficult for the management of any organisation to improve environmental performance without the active co-operation of all members of the organisation. The sooner students are exposed to the basic general requirements of environmental management systems the more likely they are to be able to apply their knowledge when employed.

The advantages of having such experience relate to the need for environmental awareness, education and training. BS 7750 lays particular emphasis on the latter. It states:

> The organisation shall establish and maintain procedures for identifying training needs, and for providing appropriate training for all personnel whose work may have a significant effect upon the environment.

In addition it states that:

> The organisation shall establish and maintain procedures to ensure that its employees or members, at all levels, are aware of:
>
> a) the importance of compliance with the environmental policy and objectives, and with the requirements of this standard;
>
> b) the potential environmental effects of their work activities and the environmental benefits of improved performance;
>
> c) their roles and responsibilities in achieving compliance with the environmental policy and objectives, and with the requirements of this standard;
>
> d) the potential consequences of departure from agreed operating procedures.

Meeting such requirements needs a structured approach if only to avoid unnecessary duplication of effort leading to unnecessary cost to the organisation whose personnel are being trained. It may be that training will have to be divided into that associated with:

- profession/occupation,
- industry,
- company,
- site,
- the particular job being undertaken.

For maximum efficiency such specific training activities need to be underpinned by a general environmental knowledge base. Opinions will differ on what this knowledge should be and how it should be delivered. In the author's experience everyone, both as members of the workforce and as environmentally responsible citizens, needs to be aware that:

- all organisational activities, products and services interact with, and have some effect upon, the environment;

- such effects are caused by:
  - what the organisations do themselves,
  - the goods and services they obtain from others,
  - the investments they make in the activities of others;

- adverse effects are caused not just by emissions to the different sub-environments but include, for instance, visual impacts;

- reduction of emissions is of major importance in limiting such effects and can be achieved by the use of alternative technologies and materials, waste minimisation, re-use and re-cycling programmes.

In addition there should be an awareness of:

- how environmentally protective measures are decided upon, implemented and enforced;

- the corporate and personal penalties for non-compliance with such measures;

- the impact on the population's well-being of such non-compliance, for instance, contamination of water supplies due to unauthorised disposals;

- the link between local activities and emissions and global problems.

A general issue which will need to be addressed in training programmes is that of management philosophy. Some practitioners have compared the continual improvement requirement in BS 7750 with the corresponding requirement in **BS 7850: Total quality management** (1992) and have argued that what will be increasingly called for is a total quality management (TQM) approach. Two important aims of TQM are to set a zero defect target and to achieve it by the use of 'right first time' methods.

In the context of environmental management:

- a zero defect target does not mean zero emissions but zero infractions of the organisation's environmental policies; and

- 'right first time' may have to be 'right the only time', there being no chance to rectify mistakes.

There is a further need which must be addressed, and that is being able to communicate environmental information to the public in a form which the non-specialist can use. From the author's experience this will place a substantial burden on organisations of all types and sizes and will add a new and exacting dimension to many courses. Yet unless this ability is developed by the relevant personnel, an organisation may be unable to demonstrate the adequacy of its environmental performance to those it wishes to influence or re-assure.

It is evident from the above that there are substantial environmental education and training needs which will have to be met. Meeting the needs of those entering the workforce will be a considerable task. Even more daunting, because of the numbers involved, is the training of those already in the workforce, particularly those in smaller organisations. It is not only the personnel of the larger companies who will need environmental education and training. Both EMA and BS 7750 include the need for organisations to ensure that their suppliers of goods and services comply with the purchaser's environmental policies. Article 13 of the regulation mentions the participation of small and medium-sized enterprises (SMEs). The Department of Trade and Industry/ Department of the Environment consultation paper (referred to on p 784) says 'SMEs are as subject to the commercial and legislative pressures relating to the environment as larger firms'. Such enterprises may have special problems in organising training because of the size and composition of the workforce. This means, in the author's opinion, that the environmental training programmes will have to be locally based and intensive in character in order to make them cost-effective.

SUMMARY

The developments outlined in this chapter are likely to have a significant effect on educational institutions, both as facility operators and as providers of environmental education and training. There is little indication at the moment that there will be any diminution in the future in the level of public interest about the environmental performance of organisations of all types and sizes. This interest can only be dealt with adequately by ensuring that personnel are environmentally aware of the consequences of their work activities.

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Chapter 5

The creative use of land round colleges: sustainable grounds management

Bill Lucas
Director
Learning through Landscapes

INTRODUCTION

My organisation, Learning through Landscapes, is interested in the landscape round an educational institution – not only in making it pleasanter and more aesthetic, but also in its potential use as an outdoor classroom and space for informal activities.

A very useful reference document is **Colleges going green** (1992). In it, author Shirley Ali Khan listed a number of environmental action areas. Several of them are of particular relevance to the management of the external environment of schools and colleges:

- aesthetics/design,
- buildings and building materials,
- curriculum,
- site maintenance,
- transport, and
- waste management.

All of the above need to be considered when planning the areas round a college.

SCHOOL AND COLLEGE ENVIRONMENTS

The first sight of an educational institution is often a high fence. Sometimes they seem to be designed to keep the students in rather than the public out. They are often ugly: chain-link fencing with a barbed-wire top. As you enter the grounds it is quite common to be confronted by large waste bins, which have been sited for the convenience of the lorries which come to collect them. School and college grounds usually fall into one of two types. There are modern suburban ones which, on completion of the building, are usually provided with a concrete path to the front door and another concrete path following the building contour. The land is then levelled and grassed. There is little or no thought given to the cost of maintenance or of the aesthetic appeal of the landscape. The other type, generally city institutions, are usually surrounded by a tarmac playground and then a high wall or fence with other buildings beyond. There is often no green in the environment, and no natural colour. A particular problem with this type is that a tarmac playground with fast moving children frequently causes accidents.

What is missing from both these scenarios is any concern for the people for whom the buildings are ostensibly designed: the children or the students. In today's ever more commercial and market-based climate, these are the people whose needs should be put first and foremost – they are the 'customers'.

THE VALUE OF LANDSCAPE

A landscape can be depressing, but if carefully planned it can create uplift and actually improve the learning experiences for every member of an educational institution. People have a need for variety and quality in their learning environment.

Let us consider the matter of the perimeter fence. The first question to ask is whether a fence is necessary at all. It may be that security is taken care of at the entrance to the building itself and that a barrier at the perimeter is unnecessary. If a fence is necessary, must it be chain-link? In one primary school the children, working with a landscape consultant, designed a colourful wooden

fence on the theme of a set of coloured pencils standing on end. Another possibility might be a Japanese-style approach; a bamboo screen covered with climbing plants. The opportunities are endless, limited only by imagination.

One thing which should always be present in the grounds around a school or college is some form of seating. This need not necessarily be formal seating. The edges of raised flowerbeds can be set at the right heights and be the right shape for sitting. Rustic benches can be built round the base of trees. Seating is perceived by the user as a valuable resource but is rarely provided.

If trees are to be planted, care should be taken in selecting them. It should not necessarily be assumed that they must all be native British species. In a multi-cultural community, a more imaginative approach may be needed.

One trend in recent years has been to create 'wild garden' areas. Wild flowers can be introduced and grass left uncut. There is a danger, however, that this can produce an isolated corner for people to look at, rather than an environment in which they can move, play and work.

Water is a great asset, and ponds can have an excellent educational value as well as an aesthetic one. Their edges can provide habitats for new flora and fauna. They should be made accessible and it is possible to make them accessible to the disabled if they are raised above ground level.

There is scope for considerable originality in planning college landscapes. Hard as well as soft features can be of value. One school has created a turf maze; another has a sculpture garden. Murals can enliven ugly buildings; signposting can be redesigned and used as a decorative feature, especially as it can be multilingual. On new sites, spaces between buildings can in some circumstances be designed as glass-covered dry walkways. If students are engaged in landscaping initiatives through project work, the very act of bringing about improvements can have an enormous educational value.

THE PLANNING PROCESS

Over a five-year period a landscape can be transformed by skilful replanning and planting. If an improvement is to be made, a systematic planning process needs to be undertaken.

1. Survey what you already have by way of landscape. What is it used for? How is it currently managed?

2. Identify what is really needed, with the full involvement of the students.

3. Produce a draft master plan. This will not be for immediate completion but should be a plan of where you want to get to in the next five years.

4. Cost all the elements you would like to introduce and prioritise them. Decide the order in which they would be implemented.

5. Locate sources of funding. This could include the possibility of local sponsorship or obtaining funding from European sources.

Your aim should be to produce **special places for special people**.

Vandalism is one factor to consider when implementing your landscape plan. Involving the community – especially students – in all aspects of the process, wherever possible, is one way to try to reduce the threat. However, there are no easy answers. Vandalism can be minimised by careful planting and appropriate design. Plant in protected areas first and move outwards; avoid planting single trees which are easy to rip out. Have a contingency fund to replant when vandalism occurs. Experience shows that in all but the worst areas, patience and perseverance pays off in the end and improvements can be made.

Another factor to bear in mind is the cost of upkeep. Although the initial cost of improvements may not be high, the cost of maintaining them in quality condition needs to be borne in mind from the outset.

Learning through Landscapes can help with advice, consultancy, and materials. For further information, contact Learning through Landscapes, Third Floor, Southside Offices, The Law Courts, Winchester SO23 9DL, tel: 0962 846258.

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Chapter 6

Environmental transport strategies for educational institutions

Phil Haughton
Green Initiatives

BACKGROUND

Green Initiatives was set up as an umbrella business to initiate, help, advise and support any business ideas which would enhance the environment. Green Initiatives is a company with a difference. It sets out to reconcile commercial success with a powerful ethic of 'greenness', openness and honesty. Green Initiatives is dedicated to promoting genuinely environmental products and services – not only those doing less damage to the environment than others, but also those which have a positively beneficial impact on the environment and on people.

Green Initiatives also does work for the Environmental Transport Association (ETA), which is the voice of transport users who are concerned about the environment. Launched in 1990, it is the fourth European organisation of its kind and works closely with other transport and environmental groups.

The ETA campaigns for environmentally sound transport, in particular:

- protection of the natural environment and our national heritage from the damaging effects of transport;
- priority given to the most environmental friendly forms of transport, for example, making our towns and cities better for pedestrians and

cyclists, and making our trains and buses reliable, attractive and affordable;

- elimination of unnecessary journeys and distances.

The ETA is the environmental alternative to the motoring clubs such as the AA and the RAC. Unlike them, it does not lobby for more roads. Instead, the ETA campaigns for better public transport, for a sound and sustainable transport system for Britain.

INTRODUCTION

Undoubtedly, the biggest problem in transportation is the excessive use of and dependence on the car. To quote a Friends of the Earth briefing, the car is:

- choking the cities,
- carving up the countryside,
- bringing Britain to a standstill.

> The government's road building plans will carve destructively through Britain's countryside, placing over 160 sites of Special Scientific Interest under threat, destroying natural habitats and killing our wildlife.
>
> More roads mean more traffic – and that means more pollution. Vehicle exhausts pump nitrogen oxides, hydrocarbons, carbon monoxide and benzene into our atmosphere. Research shows that one in five of the population could be at risk from air pollution.
>
> Exhaust fumes contribute to acid rain – the lethal cocktail that is eating away at buildings and statues and poisoning our forests and wildlife. Carbon dioxide pollution from cars adds to the greenhouse effect.
>
> And every road leads back to congestion. The time and energy wasted in traffic jams costs Britain around £15 billion each year.
>
> Friends of the Earth (1991)

If we are not willing to give up or reduce drastically our use of the car, then such road building programmes will continue.

Unfortunately, the problems do not always hit home: we can still see plenty of countryside, the worst effects of acid rain are not readily seen, the debate over the existence of the greenhouse effect continues, and people do not generally suffer ill-health which they attribute directly to air pollution caused by traffic.

We are complacent, and all of this means that we can continue to justify our use of cars – and this despite the fact that they also cause mass destruction in terms of death and injury.

We have an enormous investment in keeping our cars. They provide great convenience, security and personal safety over travelling on public transport or cycling. So we don't want to give them up. When it comes to the crunch, the current situation is that while people say that matters have to change, and a switch to alternative methods of transport is desirable, in practice there is always immense opposition to car restriction. People have a commitment to maintaining their use of cars, because the alternatives are rarely as convenient.

TRANSPORT STRATEGIES

Radical solutions to the problems of reducing congestion, pollution and energy wastage touch on far-reaching issues and are also essentially long-term. To take this top-down approach requires:

- a fully integrated public transport policy, including proper links between modes of travel;
- improvements to public transport to make it efficient, affordable and a viable alternative to the car;
- a long-term strategy on transportation policy; and even
- the redesign of cities, e.g. to exclude or drastically curtail the use of cars and reduce the distance between home and place of work.

Many local councils prepare transport plans, which seek to address the congestion problems in towns and cities. One such example is the **County of Avon**

Transport Plan 1993–2013: consultation document (Avon County Highways, Transport and Engineering Department). The problem takes a long-term view, even though the county itself is likely to be abolished. In the plan, the prospects and requirements for different modes of transport are discussed, along with the possibilities for transfer between modes of transport. These are some of the comments on the use of buses:

Bus

- bus patronage is sensitive to increasing car ownership;
- bus mode share will always be greater than LRT (light rail transport);
- buses need bus lanes and other priority measures;
- effective bus lanes will take highway space, on street parking or property frontages;
- with bus priority measures, bus can achieve similar transfers from car as LRT.

(County of Avon Transport Plan 1993–2013)

The LRT is an idea long mooted for Bristol, but not yet a reality.

These are some of the comments on the possibilities for increasing cycle use:

Cycling

- cycling is a casualty of increased car ownership and road investment;
- increased cycling will depend on improved safety, security and public attitudes, equally as much as the physical provision of cycle routes;
- the provision of cycle routes alone increase the level of cycling by up to 50 per cent;
- given public transport improvements, most new cyclists will transfer from car;

- cycle routes increase cycling levels especially when combined with highway restraint measures.

(County of Avon Transport Plan 1993–2013)

This plan is no doubt typical of many, and sums up the problem. Despite the good intentions displayed, there is a lack of funding to bring about any real change. There is an immense lack of will to challenge underlying requirements. The Avon Plan has good points in it, but is basically business as usual. The plan accepts that traffic in Avon will increase by 13.5 per cent by the end of the century, and calculates how the increase can be achieved.

By contrast, Friends of the Earth have stated that we should aim to reduce urban traffic by 30 per cent by 2005.

CHANGING ATTITUDES

One of the big difficulties in effecting changes in transport habits is that of image. The Avon plan overtly recognises this in its comments about buses and cycles; both modes of transport are 'casualties' of increasing car ownership. It is the car that carries prestige and a glamorous image; other modes of transport seem unattractive, inconvenient. Clearly, increasing the use of cycles and buses, etc. depends on changing attitudes as much as improving facilities. But at present, non-car modes of transport suffer from perceptions of:

- poor image,
- inconvenience,
- discomfort (especially taken in conjunction with the British climate).

A lot of work needs to be done to change attitudes and to increase the prestige of alternative forms of transport. Design and image are crucial, as well as actual improvements. In environmental terms, the aim is to make the use of public transport become the norm.

PRACTICAL POSSIBILITIES

There are many ideas in circulation and various schemes in operation. Some aim to punish and discourage the motorist directly, for instance:

- increasing car park fees;
- reduction in car parking spaces;
- restrictions on access to towns and cities;
- tolls on roads; and even
- the encouragement of gridlock to force transfer to public transport.

There are also more positive and encouraging possibilities, for instance:

- park and ride schemes;
- the encouragement of car sharing and car pooling, by positive discrimination in favour of more fully occupied cars;
- other forms of positive discrimination in favour of non-car users;
- marketing and promotion of alternatives to the car.

WHAT CAN COLLEGES DO?

The above ideas are generally long-term or require initiatives from central and local government and transport authorities. But colleges cannot expect direct support from government bodies and local councils in bringing about changes which would alleviate their specific car parking and other transportation problems.

What needs to be done is to look at measures which can be taken in a more individual and creative way, at the local and college level. It is most probably by actions taken at grass roots level that attitudes will gradually change, and an impetus be set in motion for more general change. By taking a series of short-term relatively small-scale, cost-effective measures, real differences can be achieved.

A fairly typical example of the problems faced by many colleges is that of the University of the West of England at Bristol (UWE) – formerly Bristol Polytechnic. UWE is housed in fairly modern buildings on the outskirts of Bristol. Access is primarily by car and also by bus. The hill terrain, lack of facilities and lack of suitable cycle routes make cycling an unattractive option. There is no convenient rail link.

In common with other higher education institutions, UWE has seen an enormous expansion in student numbers – a 50 per cent increase over the last three years. The number of students is now 17.5 thousand (total enrolments). The figure is now levelling off, but inevitably UWE has an immense car parking problem. Cars are parked on sports pitches and all along the verges of the road leading to the site. A visitor is immediately struck by the dominance of the car. Cars are parked everywhere, and car parks are a major feature of the signposting around the grounds.

By contrast, the cyclists have a tough time of it. There are insufficient cycle sheds, which means that cycles are chained to all the railings and are even taken into the building (primarily by staff). The footpaths are unsuitably surfaced in gravel and as yet there is no proper cycle route.

The present design and layout for the grounds is so geared to the car that it works against changes in transport use.

UWE has recognised the problem and has been trying to make changes. The university has been working with the local bus company to improve services to the site, and have also started work on the feasibility of opening up a cycle route to an access point quite separate to the road network, following an existing footpath.

Colleges situated in town and city centre sites are just as likely to have acute parking problems, but possibly less car parking space.

Colleges must start by looking at their own sites and their own facilities, and the way their grounds and exterior areas are laid out. What messages do they give about priorities and prestige/image? The process of education into alternative ways of transport must include staff and students, and there must be full consultation before changes are made. Changes will not work if they are imposed without due discussion and consultation. Market research should be conducted into the potential for change, alternatives and the most suitable

modes of transfer from cars. It is also important to make connections with local councils and companies.

Colleges should:

- lobby and pressurise local councils to work co-operatively for change which does not simply displace the problem;
- lobby local MPs;
- co-operate with local transport companies to improve services and facilities;
- enter into partnerships with local companies to gain sponsorship/ assistance with funding;
- consider use of advertising by e.g. local transport companies, cycle companies, student oriented products and services as a means of generating income.

In making changes to facilities, funding is inevitably a problem. Use of sponsorships, partnerships and selling advertising space can help. Some colleges may be in the fortunate position of being able to market their facilities; they may be able to use spare car park capacity as a business opportunity, particularly at weekends and during vacations.

There are many practical measures that can be taken, and not all of them require enormous funding. Some examples include:

- positive discrimination in favour of non-car users, e.g. by layout and provision of facilities;
- prioritising of car-parking, including protection of e.g. the disabled.
- encouragement/enforcement of car sharing, e.g. by use of permits, or odd and even day passes;
- phasing of attendance hours by use of flexi-time and careful timetabling;
- use of technology/electronic lecturing/open learning;

- any expansion of the college to include appropriate and equal inclusion of facilities;

- use of localised teaching facilities to reduce journey length;

- selling bus passes at the college.

Then there are improvements to actual facilities for walkers, bus/train users and cyclists, for instance:

- improved bus shelters: not just a shelter, but a large and comfortable space, to include seating and better weatherproofing (in co-operation with the local bus company);

- suitable cycleways, separate from roads, and including high profile entrances to the site;

- sufficient and secure cycle storage and luggage lockers (many motorists use their vehicles for carrying/storage);

- showers.

CONCLUSIONS

In the absence of a long-term, integrated transportation policy, colleges must take matters into their own hands. You can be positive by effecting small changes and taking gradual steps to get an all-important shift in attitude. Small pockets of excellence lead to more initiatives. In time, and in this way, considerable change can come about. It is important to have full consultation and to get contributions from staff and students in order to carry them along.

Colleges can approach interested companies to set up sponsorship deals, which provide good publicity. This is the type of activity that can enhance and improve the image of alternative means of transport.

Design and provision of facilities must be good to provide the equivalent convenience to using the car. But attitudes must also change to accept the environmental consequences of continued car use at present levels. With

suitable alternatives, and changes in image and attitude, there is less justification for continued unsustainable car use.

FOR FURTHER INFORMATION

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The Environmental Transport Association, 91 Heath Road, Weybridge, KT13 8RS. Tel: 0932 828 882

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Chapter 7

The environmental challenge

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AUTHOR'S BACKGROUND

I began my career in further education (FE), then moved into higher education (HE). I worked at Kingston Polytechnic before moving to the World Wide Fund For Nature (WWF) two years ago. I wanted to make the change to an organisation where it was very definitely my business to talk about the environment and to reflect on the curriculum. The WWF had just created a new tertiary post to cover F and HE, adult education and community education, plus public education through the media. My experience in F and HE as well as my environmental background with work at Kingston I thought might make me eligible for the post, which I now hold. Significantly, I am the only person in an environmental agency with this tertiary sector title.

It is important to relate my environmental background, because I learnt from my students and from fellow staff. My environmental education has been entirely from the bottom up, from assessing student work, from the students educating me, and from the teamwork of staff.

About 10 years ago, I was asked to work with my Business and Technology Education Council (BTEC) students on the integrative studies science module. I decided that an integrated module was the ideal place in which to consider the environment. Students had to bring together all aspects of the course to focus on an environmental issue, allowing them to reflect on the various elements of

their course while focusing on a single topic. The students worked in groups, with a special science tutor (not necessarily from their own BTEC course), and the library gave enormous help and support. Gradually, outstanding student projects were developed, and the students won many awards. When other polytechnic staff saw displays of the work, they asked if the same project could be adapted for degree courses. This was duly done and by the time I left Kingston, the environmental project was part of 11 degree courses. The library stored the projects and students could look at what had been done previously. To avoid duplication students each year had to design a new project and not revisit old topics, but they could benefit from work already done and make intelligent use of it. (Incidentally, the library discovered that the use of environmental textbooks was growing at a far greater rate than any other type of textbook, because it was cross-disciplinary and the usage was by students, not staff.)

My qualifications for my current involvement with WWF were, therefore, not only my knowledge of further and higher education, but also a grass roots involvement with students and a passionate belief in their power and usefulness as agents of change. Students are a resource, not a burden.

ENVIRONMENTAL RESPONSIBILITY

This is the title of a government report, produced by an expert committee chaired by Professor Peter Toyne of Liverpool John Moores University. The full title of the report is **Environmental responsibility — an agenda for further and higher education** (Department for Education 1993a). I was a member of the committee, and here I will fill in the background to the committee's report and describe its recommendations.

On the expert committee, half of the members came from F and HE, and half from industry. On the FHE side there were about 10 members, but each wearing about three hats. They had high status jobs in FHE, such as college principal or head of department, they had proven track records in environmental development, and also for getting things done, e.g. in other sorts of government initiative. On the other side, there were senior captains of industry, also with equivalent proven track records. They tended to be from large companies, from industries that have got a grip on the environmental problem and are trying to clean up their act, with mechanisms in place. These might be technical or managerial mechanisms, or both.

Gradually, as the work proceeded, the committee started to reach consensus. A turning point in the committee process was when we went on a residential course. It changed everything. The members began to get to know and trust one another. This then helped the process along so that we were able to reach the consensus in the recommendations for the report. The report itself was written by a senior civil servant, not by the committee. The simplicity of style and honesty of the language is moving:

> The environmental agenda will not go away. It affects everybody. It involves difficult and potentially painful choices. We have no option but to address it.
> (DFE 1993a, p 21)

Now, the committee when set up was given a slightly inappropriate brief. It was required to look at specialist environmental courses, and at the new specialisms needed to solve the environmental problem, including updating the workforce, the shape of F and HE and the new disciplines needed. We felt that the wrong questions were being asked, and that this would produce the wrong answers. Instead, we wanted to address the question of F and HE as major institutions spending large amounts of money, and how they are going to have to change their practices to have any environmental credibility. We wanted to report on greening the whole institution as well as matters like specialist courses and updating.

Our work followed on from **Colleges going green** (Ali Khan 1992), Shirley Ali Khan's work in the polytechnic sector. Although she was not a member of the committee, she made several presentations to it and the shape of the final report undoubtedly bears her imprint. So our aim was to promote greening of the institutions and the curriculum. But you cannot green the whole curriculum with the stroke of a pen. You need staff development and training, you need the right staff, and you need the resources.

To try and achieve further progress, the committee's report included very comprehensive recommendations, including recommendations for the funding process. In addition to the report itself, the Department for Education has issued a free leaflet summary of it, which includes a summary of the recommendations (DFE 1993b).

Briefly, the recommendations are as follows. Firstly, every FHE institution should adopt and publicise a comprehensive environmental policy statement

and action plan for its implementation. Not only that, the policy statement must include environmental education. This is not the same as saying that the function of the university or college is to provide environmental education. But it is saying that you must have an overarching, global environmental policy for your institution. This policy must be matched by targets, management systems and staff development to ensure implementation.

What are the reasons for this? There are many; this policy will be a corporate environmental strategy, just as any of the big companies have to have corporate strategies. FHE institutions have a multi-million pound turnover and the ownership of a good deal of more or less well-cared-for real estate. They are substantial – perhaps wasteful – users of energy, water, paper and materials, not all of them eco-friendly and some positively hazardous. Colleges and universities operate large-scale catering facilities, liable to generate substantial waste. Such institutions are visited by large numbers of people using various modes of transport. These reasons were all highlighted in the government report.

In addition, an attractive environment is a good learning environment – not just happy or socially responsible, but good for learning. Furthermore, there are credibility gains with employers.

The policy must be comprehensive, and it must involve appraisal of environmental impact, ongoing audits and monitoring systems. The responsibilities and commitment must be there from both staff and students. There is no draconian legislation. Commitment must come from wanting to comply, not enforcement or punishment.

Other recommendations involved using funding as a stick or carrot, and required that funding should be tied to the overarching environmental performance. So the funding would not go to environmental specialist courses, or greening the curriculum, or energy saving. Instead, it should go to the total environmental quality package. The idea of funding according to quality and performance indicators is not new. It happens already in the HE sector where research institutions are coded by quality and national and international standing on a scale of 1–5, which determines allocations of research funding.

Another recommendation relating to funding said that any savings made by environmental improvement should return to the body that made the savings,

and should not be taken by government by reducing funding in the following year. This means that the savings would benefit the institution making those savings.

The final recommendation was that there should be an award scheme, a government award for outstanding environmental performance achieved by a particular institution.

We do not know yet if the government will accept the recommendations of its committee. However, the report is a public document, issued by the Department for Education, and people can lobby on the strength of it.

PRACTICAL STEPS

I will now describe some practical steps that can be taken, starting with two specific institutional examples of projects and good practice.

Good practice examples

I begin with The Queen's College Glasgow (now Glasgow Caledonian University), which won an award. At WWF I set up a prize called 'environmental action awards', details of which were circulated to the then polytechnic sector (lack of money prevented wider circulation). The award was for the best student project relating to the environment so long as it was not a project restricted to the classroom and library. The project also had to show demonstrable environmental gain. The Queen's College Glasgow was the overall prize winner.

In their project, a group of 28 environmental management course students planned to do an environmental audit of the college, under five headings. They planned it at great length, did all their homework and the setting-up and declared a specific audit week. That meant that they got all their environmental management figures on a baseline of the same week, which they could then use as a marker for next year's measurement, and so on. The completed project report comprised five volumes and a management summary. The students then managed to get some funding to carry out another audit this year under five different headings. Their course leader, Dr Sheena Wurthmann, intends to carry out another audit in a year's time with five more headings. She feels that five headings is about right, as you cannot measure everything in the institution

at once. Gradually, institutional changes and improvements in environmental performance can then be logged year by year.

The report, inevitably, is not perfect, and there are points that could be criticised. But what it clearly demonstrates is that you can only start by doing and trying. If everyone were to wait until environmental audit techniques are absolutely right, we would wait forever. As long as we make progress, achieve some savings, some gains and start to inculcate new attitudes, it matters not if the processes are wrong or could be improved; the processes can always be improved next time, next year.

What the students on this particular project learnt was phenomenal. They developed an excellent relationship with the boiler room staff, the grounds staff, the catering staff, etc. Indeed, staff learnt a lot also. For this type of environmental initiative, you need a lot of input from the people actually doing the tasks – they are the ones who can suggest the savings.

The next example comes from Sunderland University. I visited the university and spoke to Dr Anne Wright, the vice-chancellor. Without having read the government report **Environmental responsibility**, she had decided that her priority was to green the institution as a whole, for which she was putting in place an impressive system. Sunderland's staff development programme is a central plank in this. They have devised a coherent and logical set of staff development and training plans, to start in September 1993. What is more, the training will not all be going to academics; most of it will, in fact, be going to support staff. This represents a significant shift in staff development funding.

There is also a keen, powerful team working on greening the whole institution. This team includes support staff, academic staff, students and the pro vice-chancellor. Additionally, the university has developed strong relationships with Sunderland County Council, Wearside and other Training and Enterprise Councils (TECs) and other bodies.

It was very impressive to see the priority attached to greening the institution, along with the commitment and the mechanisms in place to achieve it.

Policy and college personnel practice

For new appointments or changing job descriptions, an institution can use the opportunity to solicit actively for people with environmental experience or

knowledge, skills or interest and enthusiasm by building environmental aspects into questions at interviews. For existing staff, an institution can carry out a skills audit to find out what people already know and what they can contribute. This takes time, but using existing skills can take you a long way forward without spending money.

New disciplines

There are many of these, and it is possible to knock them as being simply the latest trend. However, they are better than nothing, and as they are still really in the development stage, they can be changed and improved.

I have already mentioned **environmental auditing**. I am on the Training Sub-Committee of the Environmental Auditors Registration Association (EARA), which has only been formed into an association for two years or so, but is now setting up a training scheme, with accreditation. The board co-operates with the Open University and has representatives from industry, e.g. the chemical industry, where they already know about auditing, and the chemical industry representatives are playing a major role in shaping the environmental audit. The board aims to devise practical training which will enable people to upgrade their ability to perform an environmental audit.

There are also **environmental impact assessments** and there is **life-cycle analysis**. Life-cycle analysis has been described as ranging from cradle to grave assessment of a product, but I would prefer to extend its scope from 'before conception' to 'after resurrection', as a more accurate description of its broad embrace.

Then there is environmental management and the extent to which British Standard BS 7750 **Environmental management** (currently being piloted) can deliver that. Now I personally have reservations about BS 7750, because I do not think it has taken the right starting point. I think you could have a nuclear power industry which would pass the BS 7750 criteria. In other words, you could do bad things brilliantly. But BS 7750 is still in its pilot phase, so there is time to build in change. It is the only environmental management standard we have at present and I would like to see some hard criticism of it at this stage, so that useful changes can be made.

Old disciplines

We do actually have a lot of experience in bringing about comprehensive and rapid change, if we have to do so under pressure, and there is much to be learnt from both successes and failures in the attempt to introduce change.

There are existing disciplines which can be related to the environment. Here, I give credit to Dr Anne Wright of Sunderland University because many of the following ideas were talked about in a thoughtful discussion with her.

There is already a lot of staff training in **health and safety**, but a lot of health and safety work leads into the environment because many of the risks are environmental ones. Much of health and safety is to do with compliance with new regulations, and compliance training is generally in place. Therefore, it would be possible to include environmental training in with the health and safety part of a staff development programme.

The kind of culture change required for environmental development in an institution is exactly the same sort of cultural change required for **equal opportunities**. The staff development occasions to bring about such a change should ideally be residential and on a person-to-person level in order to bring about the bonding which is essential for permanent culture change.

Information technology (IT) is also very important. Colleges have had to adopt IT for students and all their staff, and it has been achieved effectively. IT is a wonderful medium for delivering the necessary environmental monitoring and processes. IT literacy is, therefore, a very important part of environmental literacy.

Quality is currently a point of focus for institutional performance, and this is useful, particularly from the point of view of hijacking it for environmental purposes. There are many quality mechanisms around, and the word environment could easily be substituted for quality. It is relevant, appropriate and urgent. One does not actually have to use the phrase 'environmental education', one could simply insist on 'relevant' or 'appropriate' education – and then environmental education would result.

Similarly, **enterprise** can also be hijacked, as can the concentration on **Europe**. Environmental problems do not recognise national boundaries, therefore we must have Europe-wide partnerships with real bonding and trust, and we must

start at grass roots level. For instance, the many students who go to other European countries should go and do some environmental work and find out the problems there. The beauty of this is that when they come back, they notice the problems and possibilities here too. So European concerns can be hijacked for understanding environmental problems, and there is often money to be had for European projects.

Pricing

This is very important. My remarks on pricing are informed by an economist, Richard Tapper, who reported to me on a recent conference on economics and the environment.

Basically, in environmental terms, pricing is about using economic instruments. It is about setting prices so that they become levers. VAT is used as an economic instrument, as is raising the price of e.g. petrol, making unleaded petrol cheaper, and so on. These are instruments, not true pricing, as they are artificially manipulated prices. Pricing works in two ways; it may be penal or it may be artificially lowered via subsidy.

Pricing works best when it is possible to switch to alternatives. You can make people switch to unleaded petrol because it is available. But it is not so successful if there is no ready alternative. Prices can be maintained at high rates to discourage e.g. cigarette-smoking, but without an attractive or reasonable alternative or a profound educational understanding that it is wisest not to smoke, people will continue to smoke.

Such economic instruments work if monitoring is possible, whether it is done by government or the interested party. There must be a perceptible measurement to prove that the economic instrument used is working.

Savings can be made by re-use and recycling. The Americans use the term 'waste stream'. This means that if you want to recycle, you must guarantee a market for the person doing the recycling. Therefore, you buy back from the person you sell your waste to. It is not enough to take newspapers to the pulp factory, the factory has to ensure that there is a market for the recycled paper. So, why not buy back the paper you are recycling? This sets up a flow, the waste stream. In the USA, newspapers must contain a percentage of used newsprint. It is only 10 or 20 per cent but it guarantees an outlet for pulp mills recycling paper.

On the other hand, it is difficult to use pricing as an instrument if you have a monopolistic market. Competition provides a better setting for the kind of economic levers that pricing can provide. For pricing to work well as an instrument there also needs to be high demand elasticity, which means a growing and expanding market for the product.

Natural assets have never been truly priced. No government has ever set figures for natural assets and devised a coherent pricing policy. Some companies feel unduly pressurised if there are severe penal prices on their products – e.g. oil or energy companies. They feel that there is not a level playing-field for them and other companies are 'free riders'. But such companies do not see that they have already had an artificial benefit. These companies can only see that they have an artificial dis-benefit or penalty.

Vision

Lack of vision and perception is a real problem. If companies persist in tunnel vision about themselves, it is very difficult to make practical change.

A good example of a more far-sighted company is Volvo. Instead of seeing itself as a car manufacturer *per se*, Volvo thought about its role, and saw itself as a 'people mover'. The next stage was to think about how the company could adapt to provide the service that is its business. So Volvo moved into mini-buses as a more environmentally sound way of moving people.

The stage beyond that was to go beyond the idea of being people-movers and to think about why people need to move. How about enabling people to stay put? To do that, you could develop and diversify into computer networks for home-working.

A company with this type of thinking can do anything because the recognition is that, basically, they are selling satisfaction. As the satisfaction goalposts move, the company can move with them and actually get ahead of the market. But if a company thinks rigidly along the lines of being, say, a car manufacturer, then it has to lobby to protect the car industry and the motorway industry. The way forward for companies – and that now includes colleges – is to shed their blinkers as Volvo has done, in order to make development and diversification possible.

UNDERSTANDING THE CAUSES OF THE ENVIRONMENTAL PROBLEM

The first point is that environmental problems are symptoms. Environmental agencies, including WWF, have been acting in the main as fire-fighting institutions or whistle-blowers. They are seeing and acting upon the symptoms. But in the past they have not asked enough questions about the first stage – what causes these symptoms. Why have species disappeared, why has water become so polluted? Agencies are now looking into these questions more closely. The WWF has moved from looking at species disappearance, to habitat, to pollution.

I wanted to make a list of the causes of environmental problems, so I collected and classified every piece of environmental problem information I received, and I found that they could all be put down to three headings:

- excessive use;
- development; and
- pollution and waste.

Excessive use is non-sustainable use, where we are using up our natural resources. Using is OK, using up is not OK.

Development is not a bad word in itself, but over-development by concretisation, urbanisation, suburbanisation, motorways, marinas, etc. is definitely harmful. Development is very significant because it has often resulted from our judgement about what is poor land that can and must be developed. This poor land, in our terms, was actually nursery land, the crèches of wildlife – coastlines, wetlands and so on.

Clearly, a great many of our environmental problems come from pollution, in all its many forms.

In summary, you could say that we no longer live in a sustainable way inside our local, regional or natural boundaries. We have reached outside our boundaries and grabbed the natural resources beyond. Our food and our goods travel all round the world, our holidays go all around the world and we are reaching beyond our boundaries all the time. The other thing we have done

outside our own natural boundaries is to dump our rubbish there. We have broken the rules by taking from beyond our boundaries and chucking our rubbish out. This is a form of stealing from and then polluting someone else's territory, and we have to come to terms with that.

WHAT UNDERLIES THESE CAUSES?

My discussion gets philosophical here – and I make no apologies for that.

How did we get into this mess? You have to look at history, literature, myth and anthropology to find one reason. Throughout, there is a recurring theme that mankind is somehow outside nature, its ruler, and that nature was put here to be harvested, eaten, hunted and so on. There is no fundamental understanding that we are part of nature, that we are one of nature's animals. If we see that we are part of nature, we will be able to clean up our act, because we will be playing our true part. We have a role and we have to put mankind back into nature as a partner.

Another reason is scientific laws and research. There has been a tendency to dismiss anything that cannot readily be measured as unscientific, to be left out of the equation. This has led us down a certain path. But what we need now is inter-disciplinarity whereby pure science interacts with applied or 'people' science, taking into account the political and social environment. For instance, a nuclear reactor is perfectly safe and works well provided all the staff turn up to work and do their jobs properly. But if you take the people out of the equation and imagine a breakdown in society, then clearly it is not safe. This is not far-fetched – look at Russia and eastern Europe. In general, the political and social environment is not taken as part of the equation in scientific and technological development.

The separation of church and state has led to a loss of moral direction. A complete divide now exists between moral education in the church and material needs taken care of by the state. In truth, we do not believe that moral education has a place in schools and colleges. It is as though the whole subject is out of court for education.

The other thing that has gone wrong is that all our rewards are material ones. We have lost the art of giving non-material rewards. We have devalued praise by giving it continuously or not at all. We have to learn to value people in ways

that are not material and consumerist. In order to make environmental changes we have to value people, support them and help them to achieve their goals.

It is important to remain positive in the face of all this doom and gloom; we cannot live by dread alone. We will achieve far more if we can all work together and have fun at the same time. This comes back to the comprehensive package, the whole institution policy and the involvement of everyone in the college.

SCENARIOS AND SOLUTIONS

Some years ago, James Robertson in **A sane alternative** (1983) sketched out five possible scenarios for the future and, in summary, they were as follows:

- catastrophe and war;
- draconian legislation;
- technical and scientific solutions;
- 'muddle through';
- alternatives.

I want to conclude on a positive note, so I am not going to dwell on the negative scenarios other than to point to them as a warning.

The first possible scenario is catastrophe and war. We have already seen these taking place. So much of war is environmentally based, but not reported as such. Clive Ponting's book **A green history of the world** (1991) looks at history in terms of environmental issues and problems. His argument takes a shift away from the personality-based war – from Hitler or Saddam Hussein or whoever – to the environmental issues underlying these wars. If you doubt this, remember the bombing of desalination plants and the igniting of oil wells in the Gulf war.

The next scenario, draconian legislation, is really a dictatorship scenario, with inspectors everywhere, punishment, hardship and sacrifice. This is an Orwellian, dystopian view of the future.

Next comes technical and scientific solutions – technofix. This scenario says that we should not worry about running out of materials because scientists will invent something, science will solve our problems.

Then there is 'muddle through' – a bit of technofix here, a bit of draconian legislation there, a spot of catastrophe from time to time. We are seeing that now. This scenario basically divides the world into them and us – catastrophe for them, technofix for us. The muddle through option is a mixture of pushing the bad scenarios onto other people and keeping the good scenarios for ourselves, then emigrating if necessary to somewhere more comfortable.

Finally, there are alternatives, and we have to find them. This is the scenario to go with. The alternatives will be characterised by:

- sustainability;
- efficiency;
- effectiveness;
- equity;
- justice;
- high social and community values, including attractive environment;
- peace.

The first three of these are well-recognised and self-evident. Equity and justice have got to be tackled. There are now more people starving, in pain and in degradation since world war two. We have gone downhill massively. Industrial society is not a totally successful way of life. The planet is too small a place with too many people on it for us to continue with our current consumption patterns. The effect is not equal on the environment because the weighting of consumption is heavily towards western, 'developed' countries. We must face up to our responsibilities. We must aim to achieve equity and justice.

We have to put in place high social and community values. We have to want a decent life for people, in a good environment. And we have to have peace. War must be seen as primitive, outdated and something we cannot afford.

How can we achieve these things? We have to have a vision. As things stand, we lack direction. We are trying to stop this or that practice, save this species, legislate against that problem, but we have no clear blueprint for the future. We have to build one by:

- networking;
- speaking the truth;
- learning and experimenting;
- nurturing positive emotions.

I regard my entire work as the building of alternative networks, by which I mean alternative networks inside the existing structures. Networking is vitally important.

We must also speak the truth. Do not be afraid to say that the emperor has no clothes. None of our mainstream political parties has an honest environmental policy. We have to learn and experiment by doing. Then we can build on the experience and do better. We must support each other and develop, not pass judgement all the time.

Positive emotions help enormously – this means love, trust, sharing and enjoyment. This country is breaking up into smaller sub-units, but we must share and regroup in larger units. We must also learn to enjoy other things, not based on materials possessions and consumption.

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